WATER SUPPLY REVIEW
AND
SNOW SURVEY SUMMARY

1985 / 1986

Alberta
ENVIRONMENT

Water Resources

Prepared by:

RIVER FORECAST CENTRE
and
SURVEY BRANCH
TECHNICAL SERVICES DIVISION
WATER RESOURCES MANAGEMENT SERVICES

Alberta
ENVIRONMENT

COVER PHOTO
ALBERTA GOVERNMENT PHOTO

NOTES

The Water Supply Review and Snow Survey Summary is produced annually after the close of the irrigation season.

The River Forecast Centre and the Survey Branch of Alberta Environment acknowledge the assistance of Environment Canada (the Atmospheric Environment Service and Water Survey of Canada) in providing precipitation and streamflow data for this report.

Any streamflow hydrographs and natural flow data presented in this report are based on tentative hydrometric records which are subject to revision.

Units of Measure

Parameter	Units of Measure (metric)	Conversion to Imperial Units
Snow Depth	centimetres	2.54 cm = 1 inch
Water Equivalent	millimetres	25.4 mm = 1 inch
Elevation	metres	1 m = 3.28 feet
Streamflow	cubic metres per second	1 m^3/s = 35.3 cfs
Volume	cubic metres	1 X 10^6 m^3 = 811 acre-feet

WATER SUPPLY REVIEW AND SNOW SURVEY SUMMARY

TABLE OF CONTENTS

page

Water Supply Review 1986..... 1

Special Areas 18

Milk River Basin 21

Oldman River Basin 27

Bow River Basin 39

Red Deer River Basin 50

North Saskatchewan River Basin 57

APPENDIX A - SNOW SURVEY DATA

Snow Survey Activities A-1

Alberta Snow Course Data, Mountain Area A-3

Alberta Snow Courses Data, Plains Area A-9

Snow Pillow Data A-16

Alberta Snow Courses, Mountain Area Map A-29

Index of Alberta Snow Courses, Mountain Area A-30

Alberta Snow Courses, Plains Area Map A-31

Index of Alberta Snow Courses, Plains Area A-32

APPENDIX B - ALBERTA ENVIRONMENT REAL-TIME CLIMATE STATIONS

Oldman River Basin B-1

Bow River Basin B-2

Red Deer River Basin B-3

Key Map B-4

Alberta ENVIRONMENT

LIST OF FIGURES

page

Figure 1 - Precipitation, November 1, 1985 - April 30, 1986, as percent of average 6

Figure 2 - Precipitation, Southern Alberta, Nov. 1, 1985 - April 30, 1986, as percent of average 7

Figure 3 - Mountain Area Snowpack, May 1, 1986, as percent of average 8

Figure 4 - Precipitation, May 1 - July 31, 1986, as percent of average 9

Figure 5 - Precipitation, Southern Alberta, May 1 - July 31, 1986, as percent of average 10

Figure 6 - Precipitation, August 1 - October 31, 1986, as percent of average 11

Figure 7 - Precipitation, Southern Alberta, August 1 - October 31, 1986, as percent of average 12

Figure 8 - Precipitation, May 1 - October 31, 1986, as percent of average 13

Figure 9 - Precipitation, Southern Alberta, May 1 - October 31, 1986, as percent of average 14

Figure 10 - Streamflow Hydrograph, South Saskatchewan River 15

Figure 11 - Winter Precipitation, Special Areas 19

Figure 12 - Summer Precipitation, Special Areas 20

Figure 13 - Winter Precipitation, Milk River Basin 23

Figure 14 - Summer Precipitation, Milk River Basin 24

Figure 15 - Streamflow Hydrograph, Lodge Creek 25

Figure 16 - Streamflow Hydrograph, Milk River 26

Figure 17 - Winter Precipitation, Oldman River Basin 30

Figure 18 - Summer Precipitation, Oldman River Basin 31

Figure 19 - Streamflow Hydrographs, Oldman River Basin 32

Figure 20 - Streamflow Hydrographs, Oldman River Basin 33

Figure 21 - Streamflow Hydrographs, Oldman River Basin 34

Figure 22 - Streamflow Hydrographs, Oldman River Basin 35

Figure 23 - Streamflow Hydrographs, Oldman River Basin 36

Figure 24 - Streamflow Hydrographs, Oldman River Basin 37

Figure 25 - Reservoir Storage, Oldman River Basin 38

LIST OF FIGURES (cont'd)

page

Figure 26 - Winter Precipitation, Bow River Basin 43
Figure 27 - Summer Precipitation, Bow River Basin 44
Figure 28 - Streamflow Hydrographs, Bow River Basin 45
Figure 29 - Streamflow Hydrographs, Bow River Basin 46
Figure 30 - Streamflow Hydrographs, Bow River Basin 47
Figure 31 - Streamflow Hydrographs, Bow River Basin 48
Figure 32 - Reservoir Storage, Bow River Basin 49
Figure 33 - Winter Precipitation, Red Deer River Basin 53
Figure 34 - Summer Precipitation, Red Deer River Basin 54
Figure 35 - Streamflow Hydrographs, Red Deer River Basin 55
Figure 36 - Reservoir Storage, Red Deer River Basin 56
Figure 37 - Winter Precipitation, North Saskatchewan Basin 60
Figure 38 - Summer Precipitation, North Saskatchewan Basin 61
Figure 39 - Streamflow Hydrographs, North Saskatchewan River Basin 62
Figure 40 - Reservoir Storage, North Saskatchewan River Basin 63

LIST OF TABLES

Table 1 - Water Supply Conditions in 1986 (Natural Flow) 16
Table 2 - Major Water Storage Reservoirs in Alberta, Status as of November 1, 1986 17

Alberta ENVIRONMENT

Water Supply Review

1986

The Year at a Glance

In terms of weather, streamflow, and water supply conditions in southern and central Alberta, 1986 was a year of both the unusual and the extreme. The following were some of the more significant events which occurred in 1986:

- Spring runoff occurred in February, much earlier than normal.
- Spring runoff in the Milk and Oldman River basins was much above average. Ice jams and flooding occurred, and streamflow at the town of Milk River was the highest since records were started 87 years ago.
- In mid-May a severe snowstorm paralyzed the plains area region north of Calgary. River levels in the Bow and Red Deer River basins began to rise quickly as the fresh snow melted.
- A heat wave at the end of May melted the mountain snowpack rapidly, causing flooding in the headwaters of the Bow River basin.
- It was another dry summer for the Oldman River basin. July and August precipitation was much below average in southwestern Alberta.
- Heavy rainfall in July caused extensive flooding in the North Saskatchewan, Pembina and Red Deer River basins.
- A late September storm hit southern Alberta, causing flooding in the Cypress Hills region. Monthly precipitation amounts eight times greater than average were reported for September at some locations in southeastern Alberta.

Weather Conditions during the Autumn of 1985

The autumn of 1985 was extremely wet throughout most of southern and central Alberta. Some areas received three times as much precipitation during September and October as would normally be expected. In mid-September, a major storm centered near Calgary created extraordinarily high streamflow conditions for the time of year throughout the Bow and Oldman River basins. The high flow conditions were of great benefit in replenishing storage in some of the irrigation reservoirs in the Oldman basin. Much of the precipitation during this period fell as snow. The mountain snowpack accumulation for 1985/86 was generally above average at the end of October.

Weather Conditions during the Winter of 1985/86

The weather turned extremely cold in early November. This month was one of the coldest on record for many locations. The arrival of the cold coincided with the beginning of a dry trend which persisted until mid-February. In mid-December, the weather pattern shifted from cold and dry to warm and dry. The month of January was extremely mild, one of the warmest Januarys on record for most locations. By the end of January, very little snow remained in the plains areas of southern Alberta, and the plains snowpack in central Alberta had also been largely depleted by the warm weather.

In the middle of February, winter returned in dramatic fashion with a major snowstorm which affected all areas south of Red Deer. The area of

heaviest snowfall was in the Pincher Creek vicinity. Little more than one week later, a strong warm wind blew into these same areas and rapidly melted the new snowpack. The melting was so rapid that it created flood conditions on many streams, an extremely unusual situation for southern Alberta in late February. The flow of the Milk River at this time reached a record level. The breakup of the winter river ice cover on many streams, and subsequent ice jamming, complicated the situation further. At the same time as floods were occurring in some areas, spring runoff was in progress throughout much of southern and central Alberta, several weeks ahead of the normal schedule of occurrence. Colder weather returned during the first week of March and brought a halt to the melting process, but virtually all of the southern plains snowpack had been melted and very little of the central plains snowpack remained.

March was a month of above average temperature and close to average precipitation for most areas in southern and central Alberta. At the beginning of the month, there was virtually no snow remaining in the plains areas because of below average winter snowfall and above average winter temperatures. Some snow fell during the month but this new snow melted soon after it had fallen. High winds were experienced in the south which, on several occasions, resulted in dust storms from blowing soil.

Temperature conditions were close to average for the month of April taken as a whole, although week-to-week conditions varied considerably. The first week was warmer than usual, the second week was much colder than normal, the third week was warm, and temperatures during the last week were close to seasonal norms. Precipitation during April was generally below average throughout southern and central Alberta.

For the period November 1, 1985 to April 30, 1986, precipitation was generally below average throughout southern Alberta and average to above average in central and northern Alberta. A map of precipitation for this period for the entire province is presented as Figure 1. A similar map for southern Alberta is presented as Figure 2. In southern Alberta, the only area which received close to average precipitation for the November to April period was an area extending from Coleman to Pekisko. Snow surveys in the mountain headwaters at the end of April showed the snowpack to be above average for the North Saskatchewan, Red Deer and Bow River basins, and close to average in the northern half of the Oldman River basin. A map of mountain snowpack conditions in southern Alberta at the end of April 1986 is presented as Figure 3.

Weather Conditions during the Summer of 1986

Temperature conditions during the first half of the month of May were generally below average. As a result of this cool weather, the melting of the snowpack in the mountain areas was delayed to some extent. After an unseasonably late blizzard hit many areas of central and southern Alberta at mid-month, temperatures moderated to more normal conditions. This mid-May blizzard did not have any great impact on mountain snowpack conditions. During the final week of the month, a period of hot dry weather became established during which record temperatures were set at many locations. This heat wave caused the mountain snowpack to melt rapidly.

Precipitation during May was generally above average throughout southern and central Alberta. The major storm event of the month was a blizzard which began on May 13 and lasted until May 15, and which affected most of southern and central Alberta, dumping large amounts of snow in the areas between Edmonton and Calgary.

Precipitation during June was above average in the Cypress Hills area, average in the Bow, Red Deer and North Saskatchewan basins, and below average in the Oldman River basin.

Conditions of below average precipitation persisted in the Oldman River basin during the month of July. With the exception of the Oldman basin and the extreme northeast corner of the province, July precipitation was well above normal throughout the entire province. Monthly rainfall totals exceeded 300 mm at some locations in central Alberta, where it rained frequently from the first of the month until July 19. An intense storm system crossed central Alberta between July 16th and 19th dumping 150 to 170 mm of precipitation, causing flooding in central Alberta. Snow was reported at higher elevations.

For the period May 1 to July 31, 1986, precipitation was generally above average throughout Alberta. The exception to this is the southwest corner of the province (Oldman river basin) and northwest region of the province. A map of precipitation for this period for the entire province is presented as Figure 4. A similar map for southern Alberta is presented as Figure 5.

August was generally a sunny, dry month. Precipitation was well below normal throughout the North and South Saskatchewan river basins in the month of August.

September brought with it cool and showery weather which turned from bad to worse at month's end. On September 25th another major storm moved into the Province, affecting the southern and central regions of the Province. As a result of this storm, total precipitation for the month of September was well above normal in southern and central Alberta. The Cypress Hills - Medicine Hat area was hardest hit by the storm. Medicine Hat, with a monthly total of 197.6 mm of rain, had the wettest month ever since precipitation records began in 1884. The towns of Altawan and Onefour had September precipitation totals which were 882% and 745% of the monthly average, respectively.

Cool and usettled conditions prevailed in the first and last weeks of October. A prolonged period of warm, dry and sunny weather from October 10th to the 25th was the predominant feature of October.

For the period August 1, 1986 to October 31, 1986, precipitation was generally above average throughout the North and South Saskatchewan River basins. A map of precipitation for the August to October period for the entire province is presented as Figure 6. A similar map for southern Alberta is presented as Figure 7.

The relatively dry months of June and August were offset by the July and September storms to produce seasonal precipitation averages which ranged from normal to much above normal, as illustrated in Figures 8 and 9. Even the Oldman river basin, despite a persistant dry spell from June to September, experienced seasonal precipitation totals which were above normal for the May 1st to October 31st period. This was largely the result of the late September storm.

Streamflow Conditions

Spring snowmelt occurred in the plains areas much earlier than usual in 1986. The main period of runoff was the last week of February, several weeks ahead of the normal time of occurrence. Spring runoff volumes were above average in the Milk, St. Mary, Oldman and Highwood River basins and in the Cypress Hills area.

At the beginning of March, many of the streams in southern Alberta were

at very high levels because of the unusually high runoff from snowmelt. These streams receded quickly during the first half of the month and then continued to recede more gradually until the last week of March. In the last week of March, temperatures in the Oldman River basin were well above average. This caused some early snowmelt in the mountain headwaters which caused river levels in that area of the province to rise again. This situation was limited to the Oldman basin however.

River levels in the Oldman basin fell during the first half of April and were steady in other areas under the influence of the cold weather of the second week of the month. The warm temperatures of the third week of April coupled with some heavy precipitation on the 22nd and 23rd resulted in rapid flow increases in most of the mountain streams. By the end of the month, river levels had returned to normal in the Oldman basin but were below normal in the other major river basins.

River levels were generally close to or slightly below average at the beginning of May. The cool weather of early May caused the major rivers of southern and central Alberta to drop to below normal by mid-May. After the mid-month blizzard, river levels in the Bow and Red Deer River basins began to rise quickly as the fresh snow in the plains areas melted. The hot weather at the end of May caused a rapid melting of the mountain snowpack and all the major rivers originating in the mountains started to rise. The Bow River, in particular, reached very high levels at Banff and Canmore, resulting in some flooding. Most of the major streams reached their peak levels from mountain snowmelt runoff at the end of May.

Rivers throughout the province receded in the month of June. By the end of June, rivers in the Oldman River basin were flowing at well below normal levels, and rivers in the Bow, Red Deer, and North Saskatchewan river basins were flowing at normal levels. River levels in the Oldman river basin stayed well below normal for the remainder of the summer. The Oldman basin did not receive any significant precipition during the July storm, and an increase in streamflow in the basin did not come until the end of September, at which time a major storm hit southern Alberta. In contrast, rivers in the Bow, Red Deer and North Saskatchewan basins responded to the rains of July in varying degrees. The Bow River showed little response to rains in the first week of July and came up only slightly in mid-July when the larger storm occurred. The Red Deer and North Saskatchewan rivers were greatly effected by July rains. Extensive flooding occurred on tributaries of the Red Deer and North Saskatchewan rivers. Streamflow on the mainstem of the North Saskatchewan river reached it's highest level since 1915 causing flooding in the City of Edmonton.

Rivers in southern and central Alberta receded in the month of August and well into September. It was not until the end of September that streamflow increased again. To varying degrees, all river basins in southern and central Alberta were effected by the storm at the end of September. Storm rainfall totals were greatest in southeast Alberta, and flooding was reported on streams in the Cypress Hills region.

The flow of the South Saskatchewan river into Saskatchewan generally remained within a normal range throughout the summer with the following exceptions: below normal flow into Saskatchewan was experienced in late June and late August; above normal streamflow was experienced in mid-July and October. A hydrograph for the combined flows of the South Saskatchewan and Red Deer Rivers into the Province of Saskatchewan is presented in Figure 10. The rise in streamflow into Saskatchewan in mid-July is largely the result of contributions from the Red Deer river.

Hydrographs for a number of other rivers are presented in the

individual river basin sections which follow this summary.

Water Supply Volume 1986

As of May 1, 1986 natural streamflow volumes for the period May 1st to September 30, 1986 were expected to be close to average for the Bow, Red Deer and North Saskatchewan basins, and below normal for the Milk and Oldman basins. The May volume forecasts as a percent of average for various key locations are presented in the table below. The 1986 actual volume figures are also provided for comparison.

Location	May 1986 Forecast May-September Natural Streamflow Volume % of average	1986 Actual May-September Natural Streamflow Volume % of average
Milk River at Milk River	67	32
Oldman River at Lethbridge	73	68
Bow River at Calgary	106	105
Red Deer River at Red Deer	115	142
North Saskatchewan River at Edmonton	95	126

A detailed account of the total streamflow volume which occurred in the summer of 1986 for the major streams of southern and central Alberta is presented as Table 1. More detailed descriptions of the water supply conditions are presented in the individual river basin sections which follow.

Water Storage Situation

As of May 1, 1986 almost all of the major storage facilities were at normal levels for the time of year. The wet weather of the previous autumn did much to improve storage conditions in the Oldman River basin.

With the wet weather of July and September, all major reservoirs, with the exception of the Waterton Reservoir, reached normal operating levels by the end of October, 1986. A detailed account of the water storage situation on November 1, 1986 is presented in Table 2. Graphs of reservoir storage throughout the season beginning April 1st are presented in the individual river basin sections which follow.

Snow Survey Data and Monthly Precipitation Data

Alberta Environment conducts routine snow surveys throughout the Province each winter and spring to monitor snowpack conditions for water supply and flood forecasting. Snow surveys are conducted in both the mountains and plains area of the Province. Snow survey data for 1986, along with maps and indexes of the mountain and plains area snow course networks are provided in Appendix A. Data from the snow pillows (snowpack measuring sensors) operated by the Department are also presented graphically in Appendix A.

Alberta Environment operates a network of 40 automatic climate stations in the headwaters of the South Saskatchewan River Basin to provide data for flood and water supply forecasting. Monthly precipitation totals since November 1985 for these stations are provided in Appendix B. A map showing the station locations is also provided.

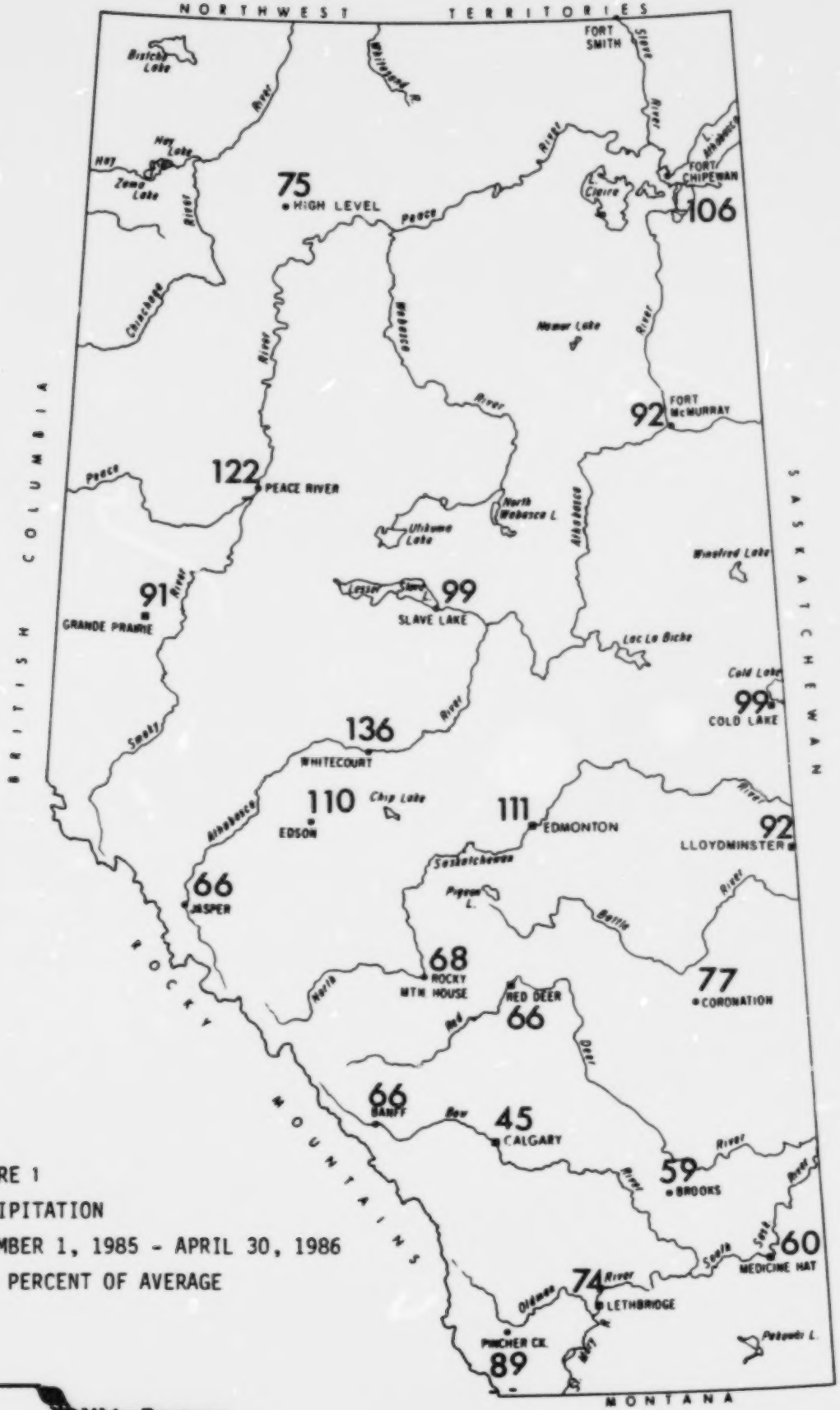


FIGURE 1
PRECIPITATION
NOVEMBER 1, 1985 - APRIL 30, 1986
AS A PERCENT OF AVERAGE

Alberta ENVIRONMENT
Water Resources

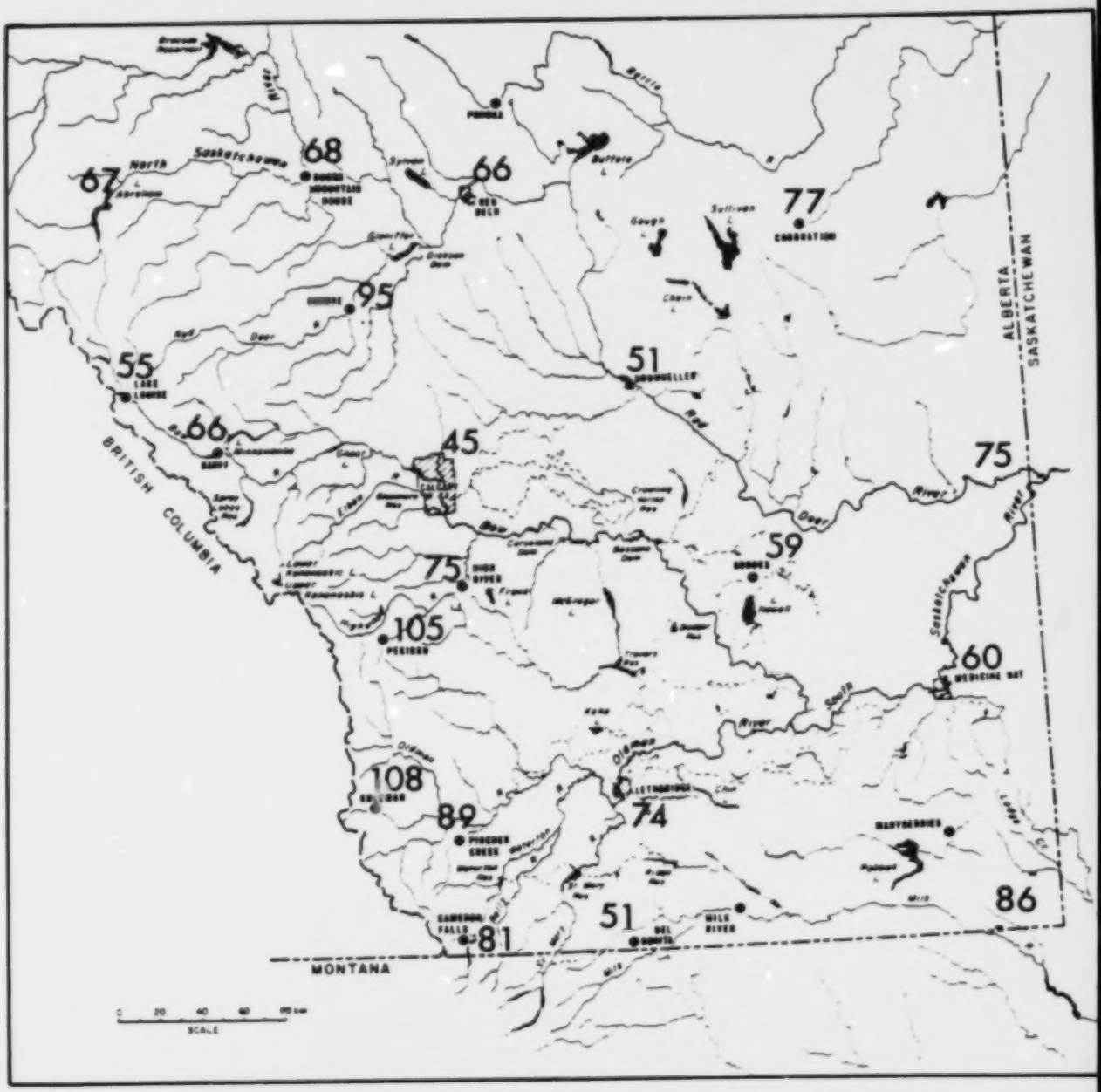


FIGURE 2
PRECIPITATION
SOUTHERN ALBERTA
NOVEMBER 1, 1985 - APRIL 30, 1986
AS A PERCENT OF AVERAGE

Alberta ENVIRONMENT
Water Resources

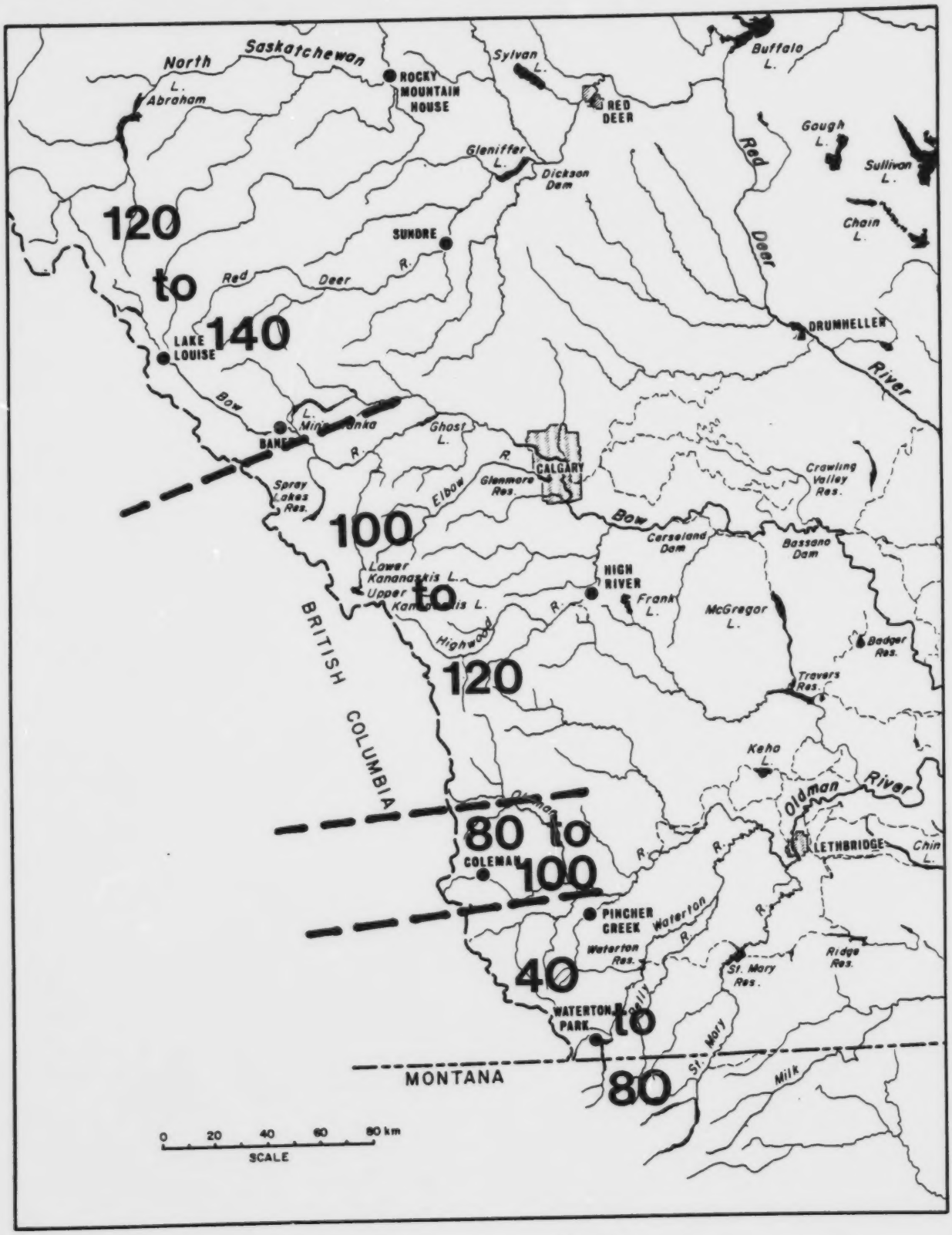


FIGURE 3

MOUNTAIN SNOWPACK CONDITIONS

MAY 1, 1986

AS A PERCENT OF AVERAGE

Alberta ENVIRONMENT

Water Resources

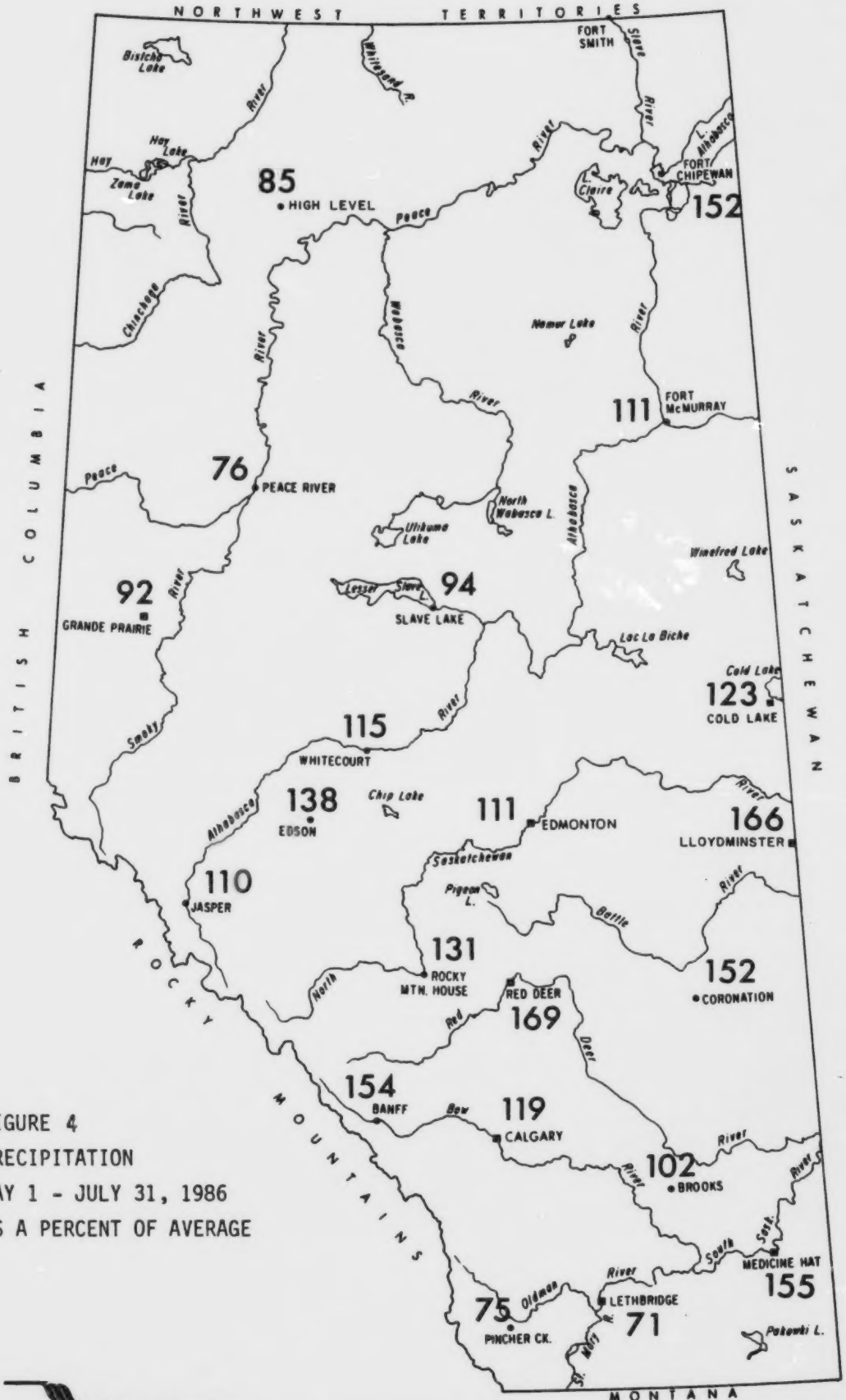


FIGURE 4
PRECIPITATION
MAY 1 - JULY 31, 1986
AS A PERCENT OF AVERAGE

Alberta ENVIRONMENT
Water Resources

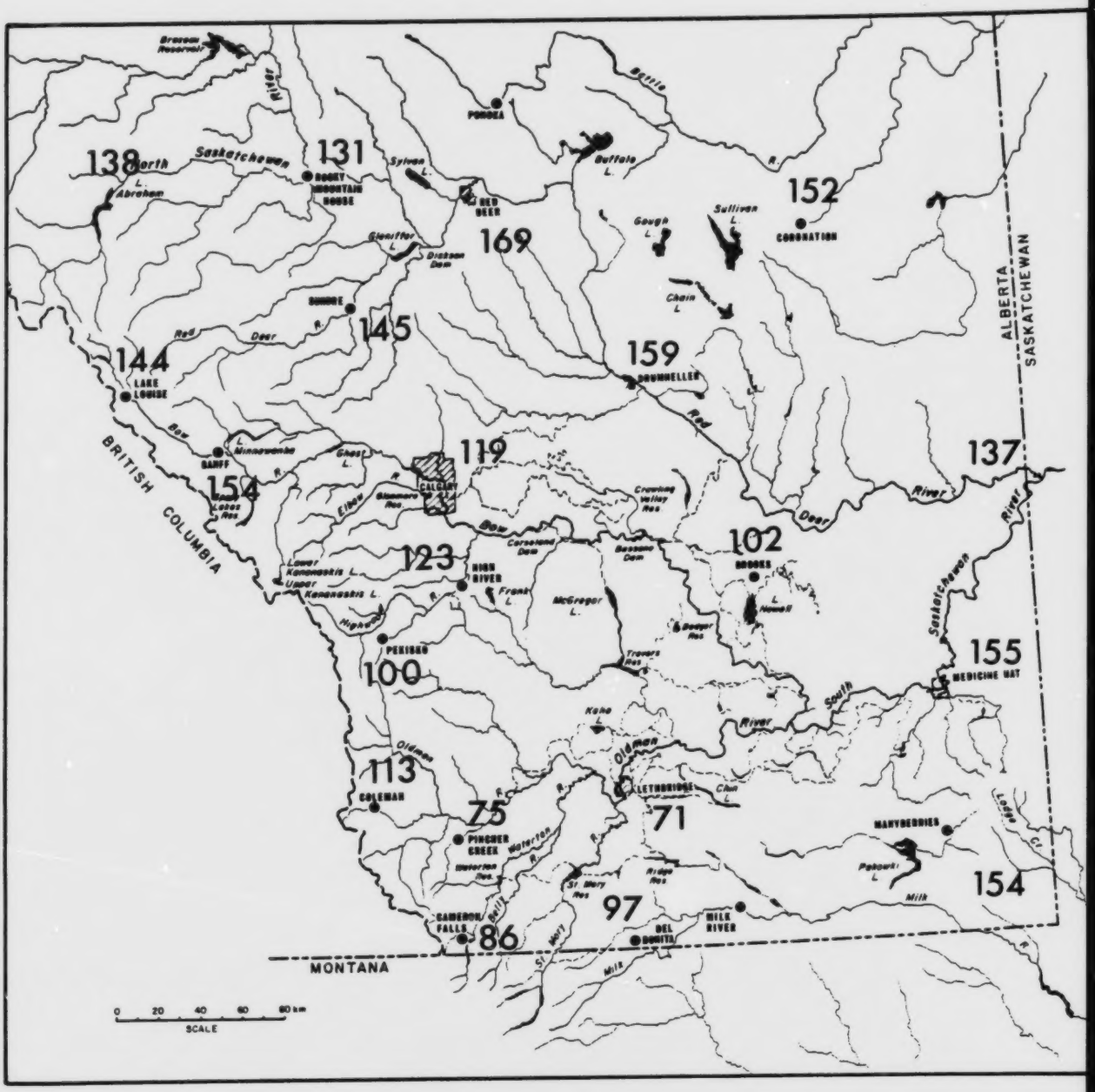


FIGURE 5
PRECIPITATION
SOUTHERN ALBERTA
MAY 1 - JULY 31, 1986
AS A PERCENT OF AVERAGE

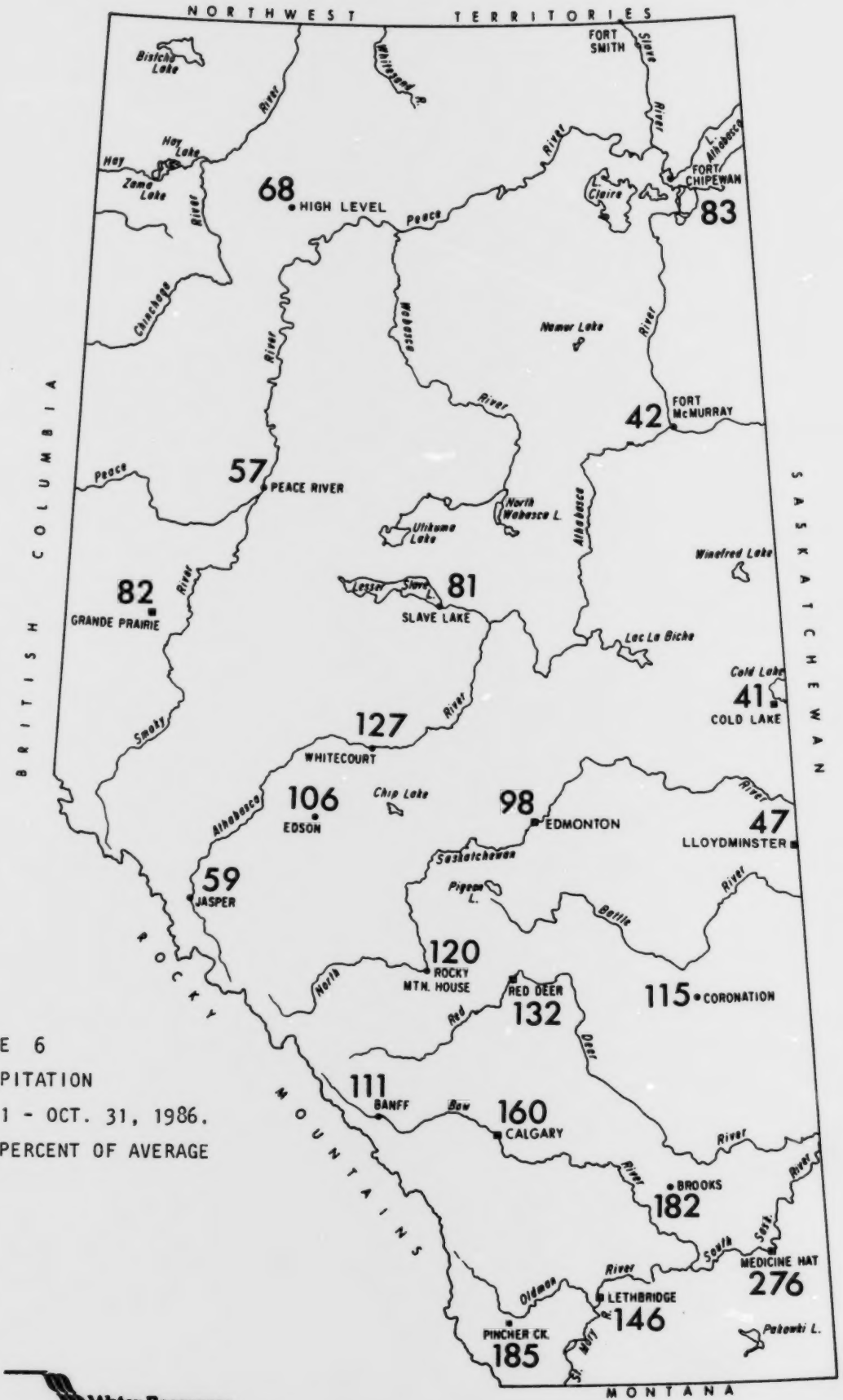


FIGURE 6
PRECIPITATION
AUG. 1 - OCT. 31, 1986.
AS A PERCENT OF AVERAGE

Alberta ENVIRONMENT
Water Resources

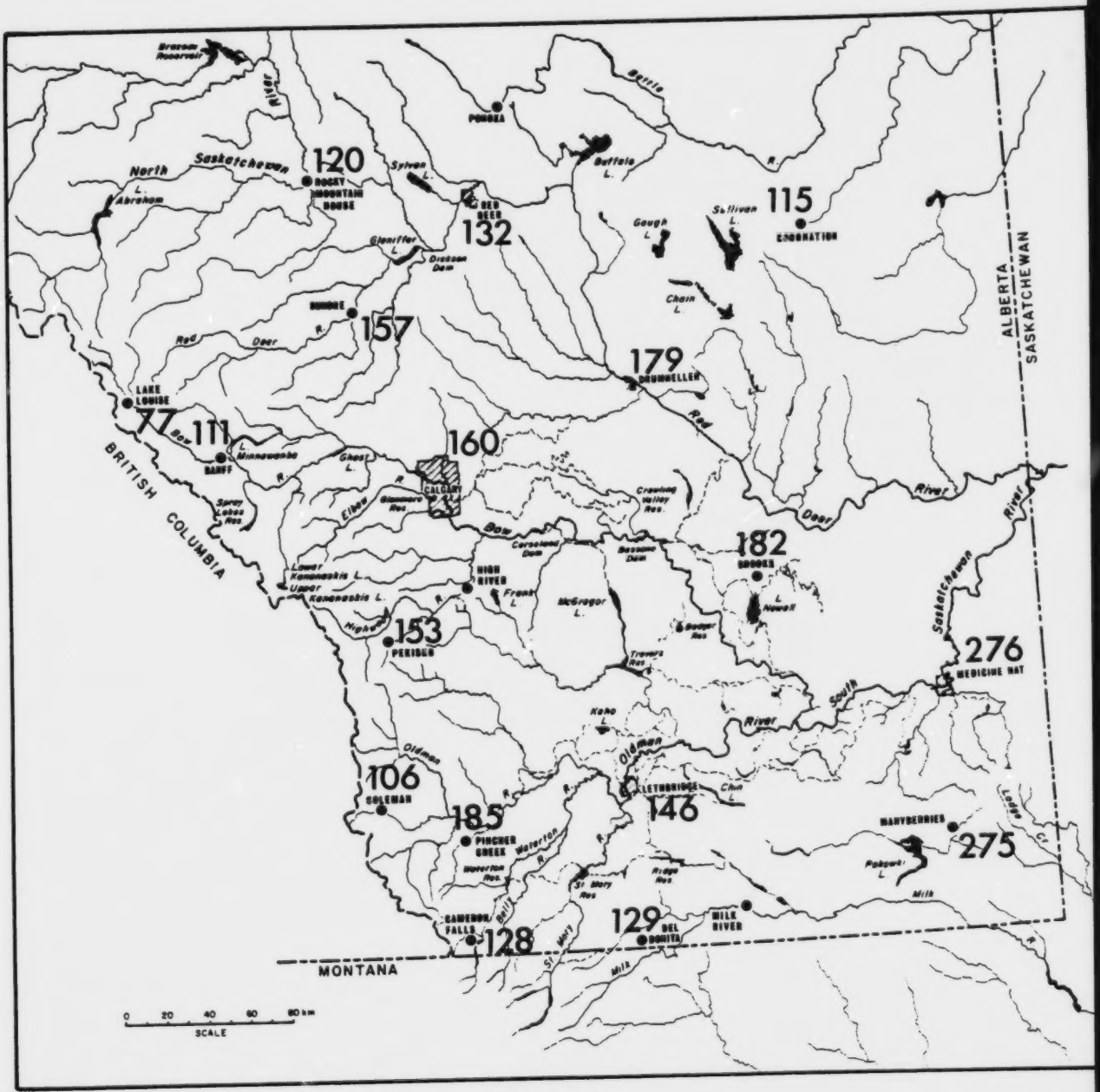


FIGURE 7

PRECIPITATION

SOUTHERN ALBERTA

AUG. 1 - OCT. 31, 1986

AS A PERCENT OF AVERAGE

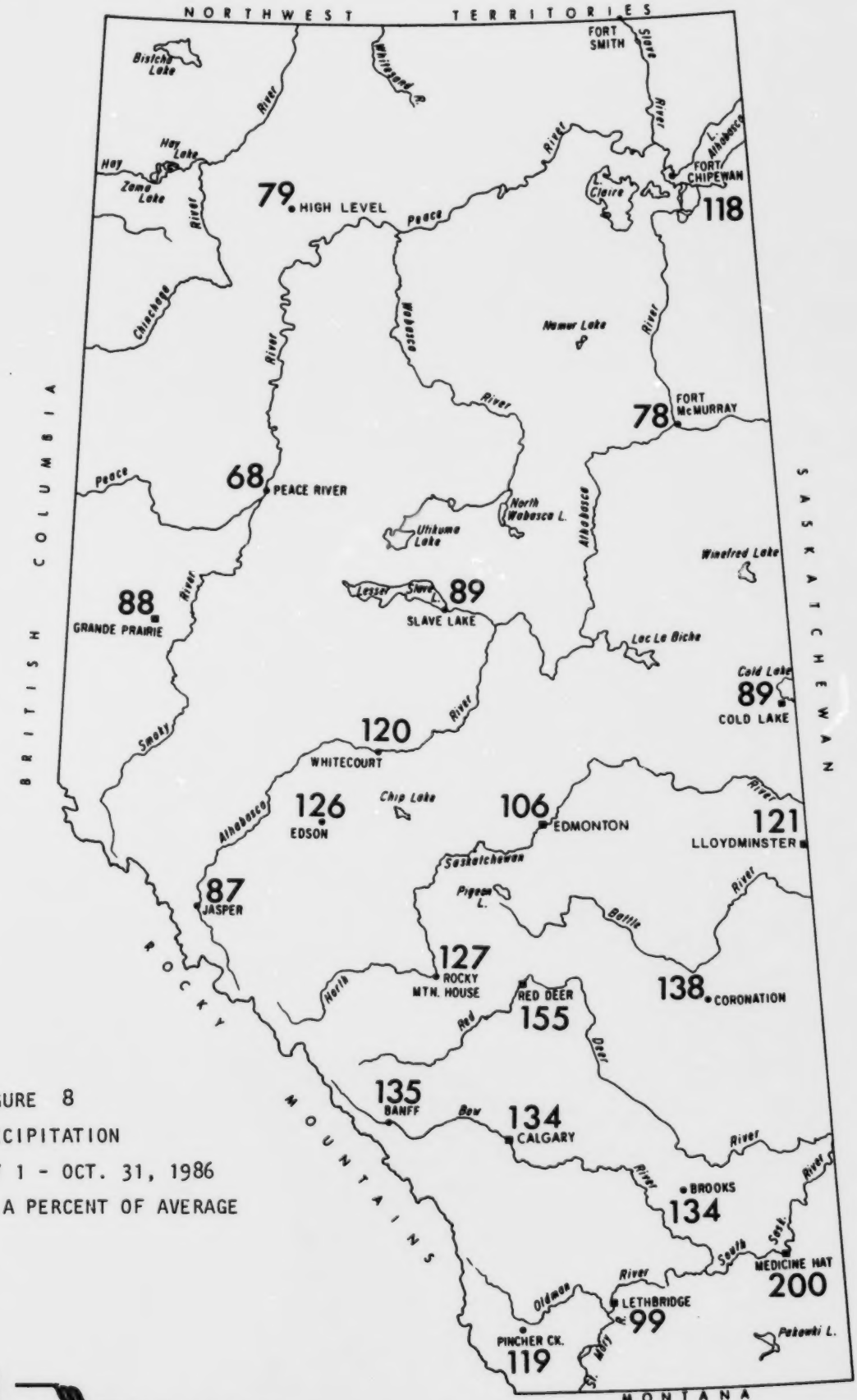


FIGURE 8
PRECIPITATION
MAY 1 - OCT. 31, 1986
AS A PERCENT OF AVERAGE

Alberta ENVIRONMENT
Water Resources

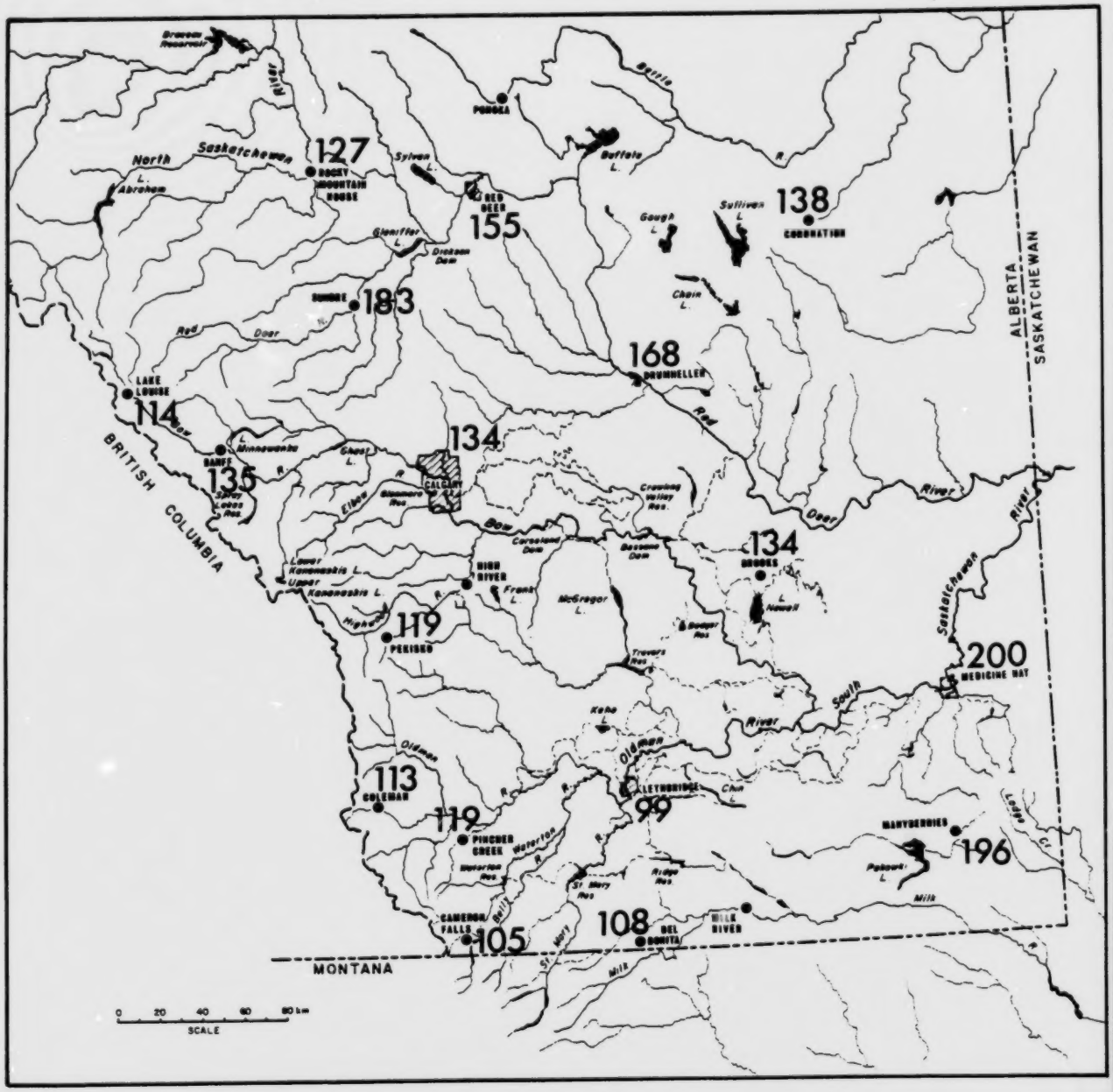
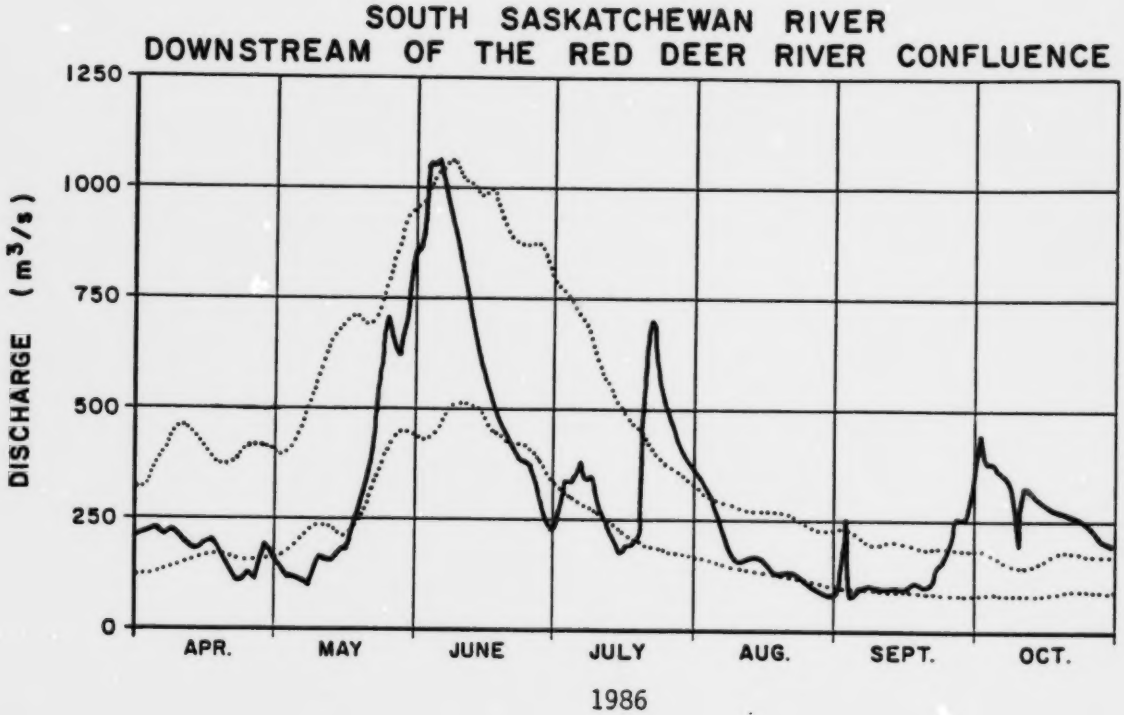


FIGURE 9

PRECIPITATION

MAY 1 - OCT. 31, 1986

AS A PERCENT OF AVERAGE



NOTE: Solid line indicates flow for current year; dotted lines show upper and lower quartile values for period of record as an indications of the range of normal behaviour.

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA

STREAMFLOW HYDROGRAPHS
SOUTH SASKATCHEWAN RIVER BASIN

FIGURE 10

Alberta ENVIRONMENT
Water Resources

WATER SUPPLY REVIEW

TABLE 1

WATER SUPPLY CONDITIONS IN 1986
(Natural Flow)

	Streamflow Volume* for entire season	
	$10^6 m^3$	% of Avg.
MILK RIVER BASIN		
Milk River at Milk River (Apr-Sept)	30	32
OLDMAN RIVER BASIN (May to September)		
St. Mary River near Int'l Boundary	490	67
Belly River near Mountain View	170	69
Waterton River at Waterton Park	440	70
Oldman River near Brocket	820	74
Oldman River near Lethbridge	2,000	68
BOW RIVER BASIN (May to September)		
Bow River at Banff	1,200	112
Bow River at Calgary	2,490	105
Elbow River	180	89
Highwood River	430	68
Lake Minnewanka Inflow	230	106
Spray Lake Inflow	320	101
Barrier Lake Inflow (Kananaskis R.)	410	104
RED DEER RIVER BASIN (May to September)		
Gleniffer Lake Inflow (Dickson Dam)	1200	143
Red Deer River at Red Deer	1450	142
NORTH SASKATCHEWAN RIVER BASIN (May to September)		
Lake Abraham Inflow (Bighorn Dam)	2,230	103
Brazeau Reservoir Inflow	1,820	133
North Saskatchewan River at Edmonton	6,870	126

* NOTE: Volumes indicate natural runoff conditions; adjustments have been made to recorded streamflow to account for the effects of streamflow diversion and reservoir storage.

1 X $10^6 m^3$ = 811 acre-feet = 409 cfs-days

WATER SUPPLY CONDITIONS REVIEW

TABLE 2

MAJOR WATER STORAGE RESERVOIRS IN ALBERTA

Status as of NOVEMBER 1, 1986

	LIVE STORAGE ($10^6 m^3$)	PERCENT OF MAXIMUM LIVE STORAGE	REMARKS	LIVE STORAGE Nov. 1, 1985 ($10^6 m^3$)
OLDMAN RIVER BASIN				
Keho Lake	59	61	*	42
Waterton Reservoir	37	32	Below Normal	63
St. Mary Reservoir	220	60	Normal	280
Ridge Reservoir	98	76	Normal	92
Chin Reservoir	780	86	Above Normal	190
TOTAL	535	65	Normal	625
BOW RIVER BASIN				
Lake Minnewanka	208	93	Normal	107
Spray Lake	261	99	Normal	236
Upper Kananaskis Lake	99	79	Normal	120
Lower Kananaskis Lake	57	90	Normal	51
TOTAL	624	93	Normal	514
Lake McGregor	319	99	Normal	322
Travers Reservoir	75	64	Normal	71
TOTAL	394	90	Normal	393
Lake Newell	136	77	Normal	127
Crawling Valley Reservoir	102	90	Normal	39
TOTAL	238	82	Normal	166
RED DEER RIVER BASIN				
Gleniffer Lake	203	100	Normal	202
NORTH SASKATCHEWAN RIVER BASIN				
Lake Abraham	1,033	73	Normal	1,019
Brazeau Reservoir	474	98	Normal	472
TOTAL	1,507	79	Normal	1,491

NOTES: * Keho Lake was expanded in 1985 to a capacity of 96 million cubic metres from a previous capacity of 47 million cubic metres.

SPECIAL AREAS

Weather Conditions during the Autumn of 1985 and the Winter of 1985/86

Precipitation in September and October of 1985 was close to average. Snowfall between the beginning of November and the end of February was well below average. November was extremely cold, but in mid-December the weather turned warm remaining that way throughout January. By the end of January, there was practically no snow cover throughout the Special Areas.

In mid-February, the storm which affected southern Alberta so greatly also dropped some snow in the Special Areas, but a week later the same weather conditions which created flooding in parts of the south melted this snow and produced spring runoff several weeks in advance of the usual time.

Precipitation in March was slightly above average throughout the Special Areas. Temperatures were generally much above average. Virtually all of the winter snowpack had melted by the beginning of March. Some new snow fell during the month but melted quickly after each snowfall.

April precipitation was generally below average throughout the Special Areas. The first three weeks of the month were quite dry. Most of the precipitation for the month fell during the fourth week.

Graphs showing precipitation accumulation for a number of climate stations in the vicinity of the Special Areas for the period November 1, 1985 to April 30, 1986 are presented as Figure 11.

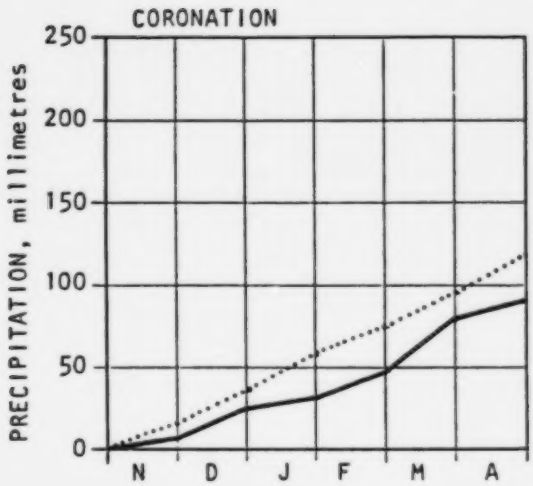
Weather Conditions during the Summer of 1986

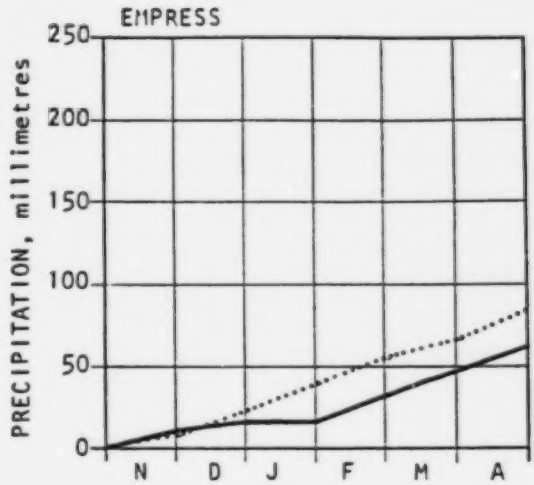
The summer of 1986 was one of above average precipitation for the Special Areas. As illustrated in Figure 12, precipitation accumulation for a number of climate stations in the vicinty of the Special Areas was generally average in May and June, and above average in July and September. Two dry spells in the Special Areas occurred in August and mid - October.

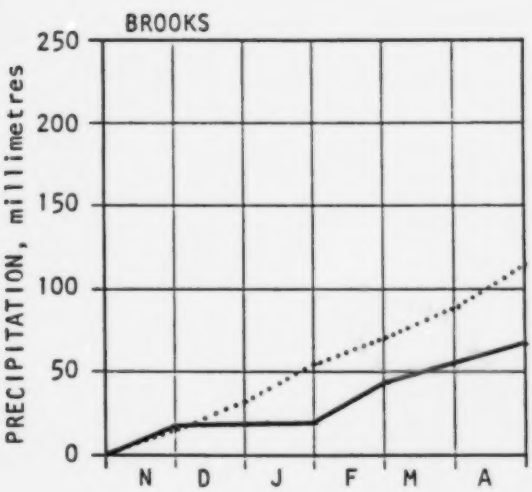
Water Supply Conditions

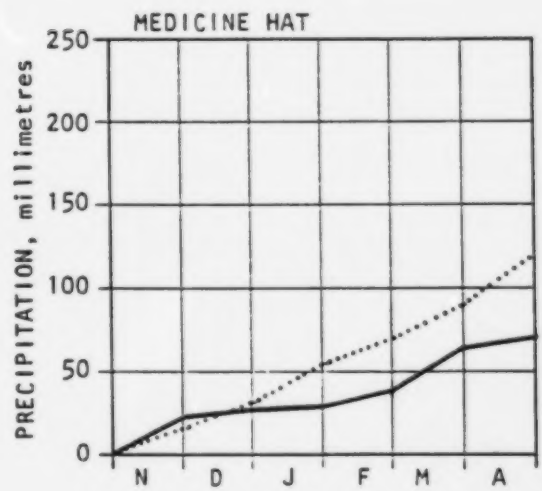
Spring runoff occurred in most parts of the Special Areas during the last week of February, several weeks earlier than normal. Spring runoff volumes were generally below average in 1986. Very little runoff was generated by the snow which fell in March or from the storm which occurred in mid-May. The May storm did, however, provide moisture to the soil which was beginning to become dry after the warm, dry month of April. Some runoff was reported in the Special Areas in the the summer of 1986 as a result of above average rainfall during July and September. The storms of mid-July and at the end of September did much to replenish soil moisture and water storage reserves in the Special Areas.

* NOTE: The Special Areas are located in southeastern Alberta. They are bounded approximately by the Saskatchewan border on the east, the Red Deer River on the south, Drumheller on the west, and Coronation on the North.









LEGEND

..... Average

——— 1985/86

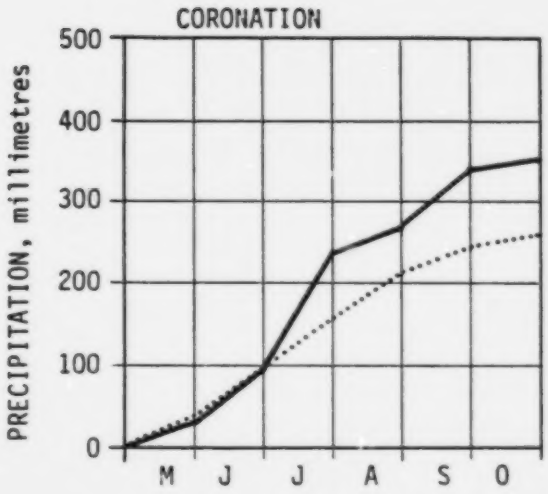
Alberta ENVIRONMENT

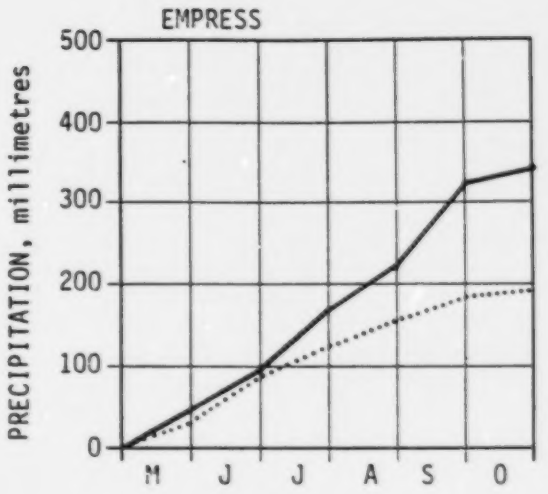
Water Resources

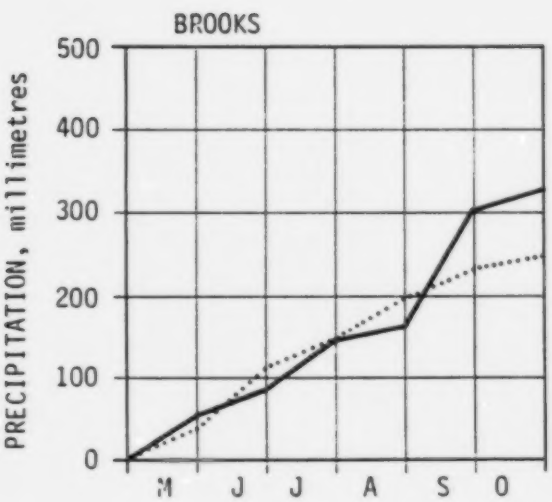
WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA

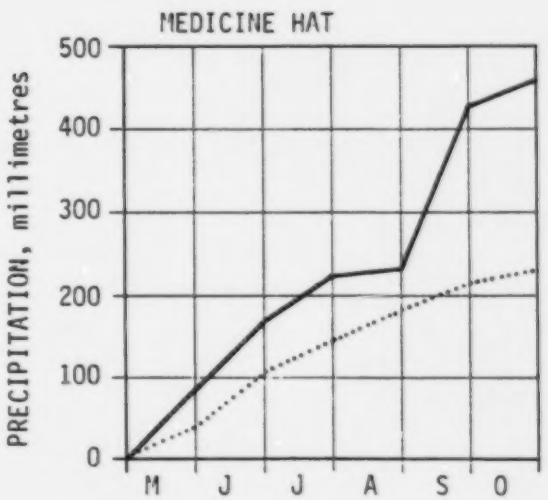
WINTER PRECIPITATION
SPECIAL AREAS

FIGURE 11









LEGEND

..... Average

——— 1986

Alberta ENVIRONMENT

Water Resources

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA
SUMMER PRECIPITATION SPECIAL AREAS
FIGURE 12 PAGE 20

MILK RIVER BASIN

Weather Conditions during the Autumn of 1985 and the Winter of 1985/86

The autumn of 1985 was extremely wet in the basin. Precipitation amounts for September and October were two and a half time the normal at the Del Bonita climate station, and three and a half times the normal at the Canada Department of Agriculture station at Onefour (Manyberries CDA).

November was extremely cold. Temperatures moderated in mid-December and became much warmer than normal throughout January. A trend of dry weather began in November and persisted until mid-February. By the end of January, very little snow remained in the basin.

In mid-February, a major storm dropped heavy snowfall throughout most of southern Alberta including the Milk River Basin. About a week later, a second storm occurred with dramatic results. The second storm did not give much precipitation to the basin but it was accompanied by very strong warm winds which melted the fresh snowpack from the first storm. The melting of the new snow occurred very rapidly. At the same time, this weather system melted the snow in the Cypress Hills, producing spring runoff from that area several weeks in advance of the normal time of runoff.

Precipitation was slightly above average during the month of March. A major storm dropped a large amount of new snow on the basin in mid-March but the snow melted soon after with the return of warmer weather. Temperatures were generally much above average during the month.

Precipitation was below average during the month of April. The first and third weeks of the month brought warm weather. The second week was cold while temperatures during the last week of April were close to the norm.

Graphs of precipitation accumulation for the period November 1, 1985 to April 30, 1986 for the climate stations at Del Bonita and Manyberries CDA are presented as Figure 13.

Weather Conditions during the Summer of 1986

Precipitation was much above average during the month of May. The blizzard which affected much of southern Alberta at mid-month did not hit the western part of the basin very hard but produced a lot of snow in the Cypress Hills. The Milk river basin received average precipitation in the month of June. Then a dry spell set in which lasted the months of July and August. The western part of the basin was drier than the eastern part. The storm which hit at the end of September in southern Alberta provided some long awaited moisture to the western portion of the Milk River basin, and an over-abundance of moisture to the Cypress Hills region.

Graphs of precipitation accumulation for the period May 1 to October 31, 1986 for the climate stations at Del Bonita and Manyberries CDA are presented as Figure 14.

Streamflow Conditions

Spring runoff occurred much earlier and much higher than is normal. In the last week of February, the Milk River at the Town of Milk River reached its highest level in 87 years of record. Most of the streams originating in the Cypress Hills also reached peak levels before the end of February. As illustrated in Figure 15, peak flow rates and the volume of runoff generated were much above average and earlier than usual on Lodge Creek. By the beginning of March, the Milk River and its tributaries, including Lodge

Creek in the Cypress Hills, were receding. By the middle of March, streams throughout the basin were back to moderate levels. The melting of the snow from the mid-March snowstorm increased stream levels slightly but by the end of the month the streams were again receding.

The level of the Milk River was below average at the beginning of April. The U.S. diversion from the St. Mary River to the Milk River began on April 1 and brought the rate of flow in the Milk River back within the normal range by the second week of the month. The hydrograph for the station "Milk River at Milk River" is presented as Figure 16.

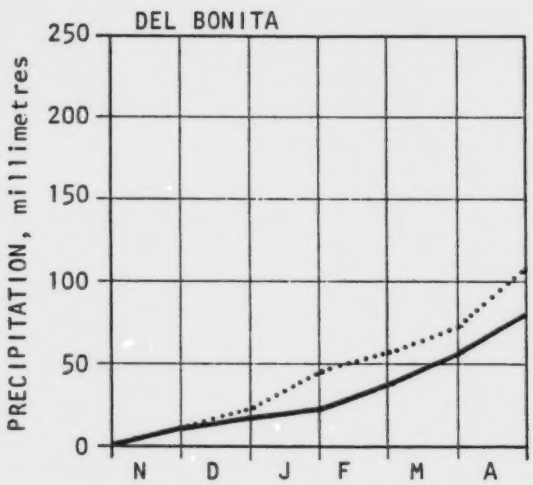
The level of the Milk River was below average throughout the month of May for three reasons: natural flow was much below average (approximately 38 percent of average); the rate of diversion from the St. Mary River in Montana was much less than normal because reservoirs in the lower reaches of the Milk River in the United States were full; less water was needed from the St. Mary River because the cool, wet weather of May reduced the demand for water during the month. With the return of seasonable weather in June, July, and August, irrigation demand from the Milk River increased and a greater amount of water was diverted, although the diversions generally stayed below normal levels.

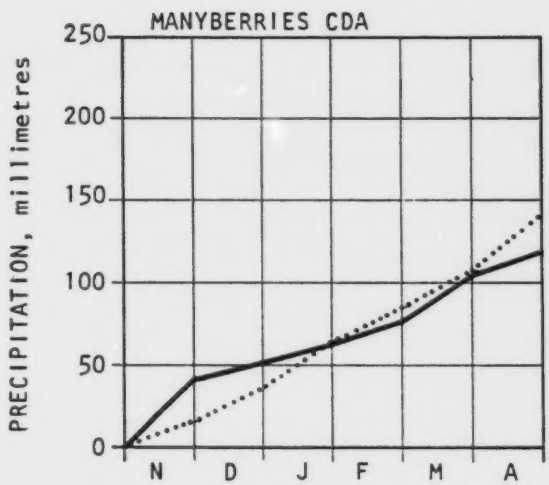
With the wet weather of September, irigation demand dropped, and diversions were reduced. The September storm generated little runoff on the mainstem of the Milk River. Flooding was reported on streams originating from the Cypress Hills. Diversions to the Milk River in the U.S.A. were terminated on September 7th.

Water Supply Volume for 1986

Much of the natural streamflow volume in the basin is produced during the spring runoff period. By the end of February, spring runoff was over in virtually all parts of the basin. As such, April to September streamflow volumes for the Milk River were well below normal, despite the fact that an 87-year peak streamflow record was broken for the Milk River in February. Lodge Creek experienced average streamflow volumes for the March to September period, and much above normal runoff in September and October of 1986.

A more detailed account of the water supply of 1986 is provided in Table 1.





LEGEND

..... Average

——— 1985/86

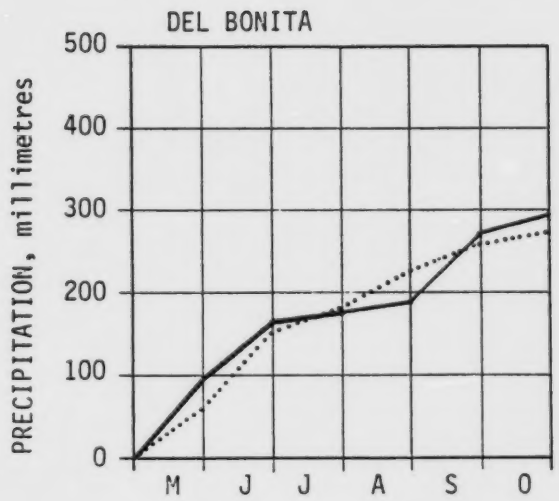
Alberta ENVIRONMENT

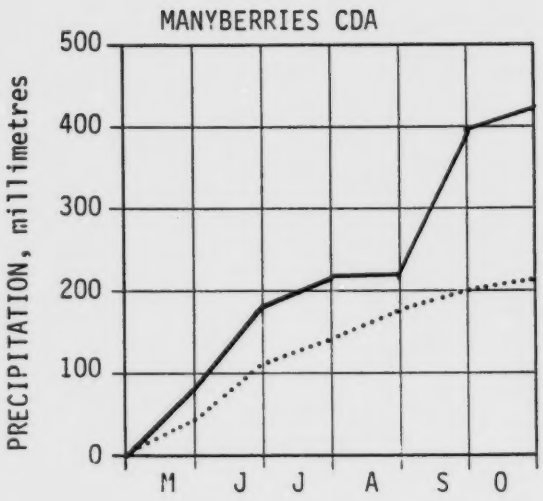
Water Resources

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA

WINTER PRECIPITATION
MILK RIVER BASIN

FIGURE 13





LEGEND

..... Average

——— 1986

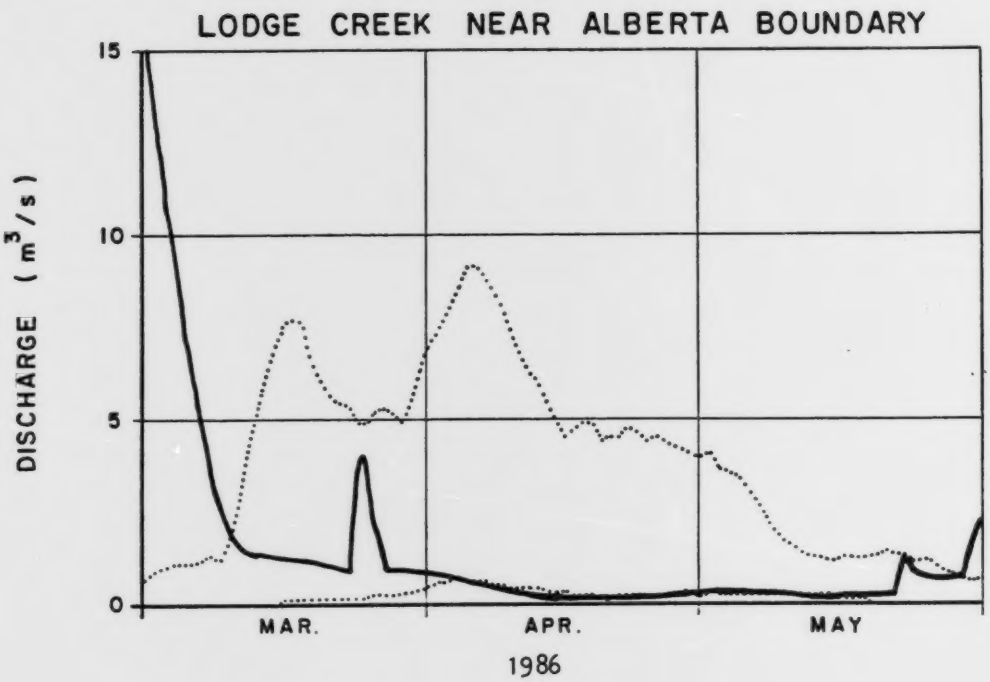
Alberta ENVIRONMENT

Water Resources

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA

SUMMER PRECIPITATION
MILK RIVER BASIN

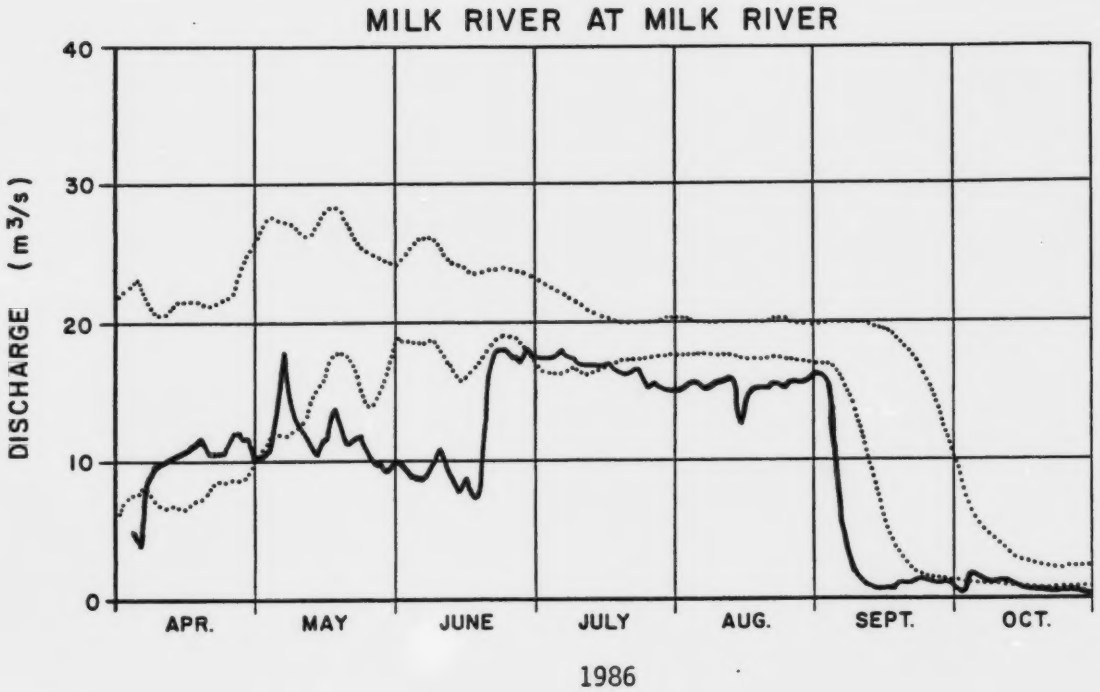
FIGURE 14



NOTE: Solid line indicates flow for current year; dotted lines show upper and lower quartile values for period of record as an indications of the range of normal behaviour.

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA	
STREAMFLOW HYDROGRAPH MILK RIVER BASIN	
FIGURE 15	PAGE 25

Alberta ENVIRONMENT
Water Resources



NOTE: Solid line indicates flow for current year; dotted lines show upper and lower quartile values for period of record as an indications of the range of normal behaviour.

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA
STREAMFLOW HYDROGRAPH MILK RIVER
FIGURE 16 PAGE 26

Alberta ENVIRONMENT Water Resources

OLDMAN RIVER BASIN

Weather Conditions during the Autumn of 1985 and the Winter of 1985/86

Precipitation was much above average in September and October of 1985. Most areas received between two and three times the normal precipitation amount. A major storm occurred in mid-September which created high streamflow conditions in many of the mountain and foothills streams. River levels remained at above normal levels until freeze-up which occurred in early November.

November was extremely cold. Lethbridge experienced the coldest November on record. Temperatures did not moderate until mid-December. At the same time that the cold weather established itself, a trend of dry weather began and lasted until mid-February. Warm weather took over in mid-December, persisting until February. January was one of the warmest Januarys on record throughout the basin. By the end of the month, virtually all of the plains area snowpack had been depleted by the mild weather and the mountain snowpack was in a below average condition.

In mid-February, a major snowstorm hit the basin, accompanied by cold temperatures. The storm deposited 30 to 60 centimetres of new snow along the foothills and in the mountains. One week later, a strong warm wind invaded the basin, bringing with it moist tropical air from the Pacific Ocean. Under the influence of this wind, the new snow melted rapidly. Runoff from the melting snow created extremely high streamflow conditions all along the foothills in the basin. Flooding was reported in the Pincher Creek area and along the St. Mary River. The high streamflow caused the break-up of the winter river ice cover, and ice jamming then occurred which complicated the situation further.

At the same time that the snow at the lower elevations along the foothills was melting, heavy snowfall was occurring at higher elevation in the mountains. Over a metre of snow fell at some locations. The combined effect of the mid-February storm and this second snowfall was a tremendous improvement in the mountain snowpack condition as compared to the end of January. February precipitation amounts were two to three times the normal amount in most areas.

The same warm weather which caused some flooding along the foothills induced spring runoff in the plains areas of the basin several weeks in advance of the normal schedule. By the end of February, spring runoff had peaked in most plains areas.

March was a month of close to average precipitation and much above average temperature. Much of the precipitation which occurred fell as rain because of the warm temperatures. As a result, the mountain snowpack did not increase as much as might have been expected during the month. In some areas, the amount of water in the pack actually decreased because of some early snowmelt associated with the warm weather.

Precipitation for the month of April was generally below average in the basin except for the Crowsnest Pass area. Two significant storms occurred, one on the 11th and 12th, and the other on the 22nd and 23rd. Much of the precipitation which occurred fell as rain.

Temperature conditions were above seasonal norms during the first and third weeks of April. The second week of the month was very cold while the last week was close to average.

The mountain snowpack was greatly reduced at lower elevations during the month of April by the warm weather and the rain. The amount of snow on

the ground at higher elevations at the end of April was not much different from the beginning of the month. In general, snow conditions were close to average north of the Crowsnest Pass but below average south of this area.

Graphs of precipitation accumulation for several key stations in the basin for the period November 1, 1985 to April 30, 1986 are presented in Figure 17.

Weather Conditions during the Summer of 1986

May precipitation was above average for most areas within the basin. The weather was cool during the first half of the month but became hot during the last week with new record high temperatures being reached on some days.

The cool weather early in the month of May delayed the melting of the mountain snowpack. With the hot sunny weather in the last week of May, the snowpack melted rapidly, resulting in high streamflow conditions for any of the rivers with headwaters in the mountains. Most of the snow had melted in the mountains by the end of May although large patches still remained at higher elevations in some areas. Peak streamflow in the Oldman basin in 1986 was from snowmelt in the mountains at the end of May.

The southwest region of the province was one of the few regions to remain dry throughout the summer, and it was not until September that any appreciable rainfall came to the Oldman river basin. Precipitation at Lethbridge was only 25% of average for the months of July and August. The dry trend was broken in September with the arrival of showery weather at the start of the month and a major storm at the end of the September. Precipitation at Lethbridge was 265% of average in September.

Graphs of precipitation accumulation for several key stations in the basin for the period May 1, 1986 to October 31, 1986 are presented in Figure 18.

Streamflow Conditions

At the end of February, streamflow conditions throughout the basin ranged from above normal to much above normal as a result of the rapid melting of the snowpack in the lower foothills.

After the first week of March, river levels generally receded rapidly and continued to do so until the last week of the month when a combination of rainfall and warm weather resulted in another rapid rise for the major streams. Streamflow was generally above average throughout the month of March.

River levels were generally above average at the beginning of April due to snowmelt and rainfall in the mountain areas during the last week of March. By mid-month, streamflow was close to normal. The storm on the 22nd and 23rd caused river levels to rise quickly on many streams but conditions were generally back to normal by the end of April.

The diversion from the Oldman River to the Lethbridge Northern Irrigation District began on April 15. The delivery of water to the St. Mary River Irrigation District from the Milk River Ridge Reservoir began on the 23rd.

Because of the cool weather in early May, river levels were generally below average during the first half of the month. Conditions changed quickly with the coming of the hot weather, however. By the end of the month, all rivers in the basin with headwaters in the mountains were flowing

at a high rate. Natural flow volumes were generally below average for the month of May. The natural flow of the Oldman River near Lethbridge was 86 percent of average.

The rate of diversion from the Oldman River to the Lethbridge Northern Irrigation District was high during May as Keho Lake was being filled. The rate of delivery to the St. Mary River Irrigation District was generally low during the month because of the cool wet weather during the first part of May.

Streamflow in the Oldman basin receded quickly and by the end of June, all major rivers in the basin were flowing at below normal levels. This trend continued until September at which time heavy rains occurred. The response of rivers in the Oldman basin to this rainfall was not great as the basin was in a very dry state. Basins to the north and east of the Oldman River basin which received far more rain during the summer were affected by September rains to a much greater extent.

The diversion from the Oldman River to the Lethbridge Northern Irrigation District ended on October 10. The delivery of water to the St. Mary River Irrigation District from the Milk River Ridge Reservoir also ended on the 10th of October.

Hydrographs for several key river and irrigation canal stations are presented in Figures 19 to 24.

Water Supply Volume for 1986

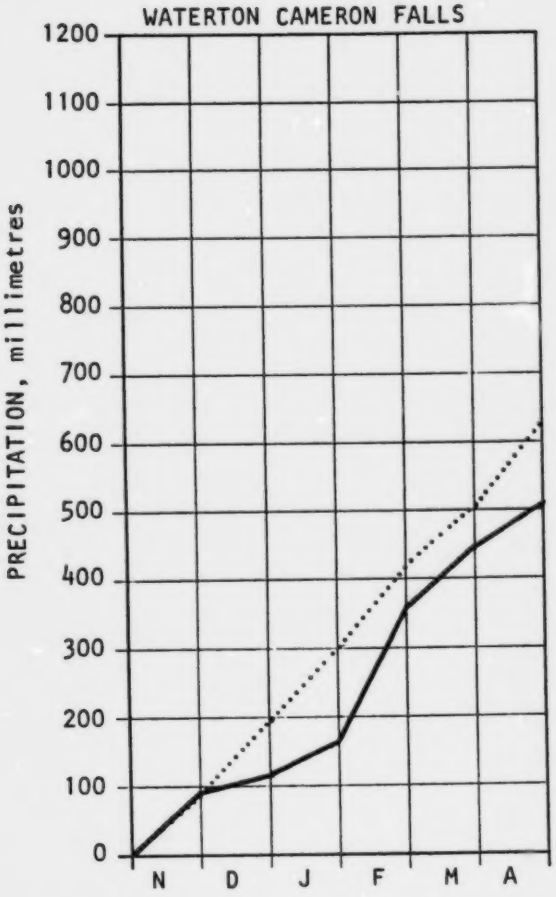
As of May 1, 1986 natural streamflow volumes for the period May 1st to September 30th were expected to be below average in 1986. The forecasts for the major rivers in the basin as of May 1st are presented in the table below along with the actual volumes which occurred in 1986.

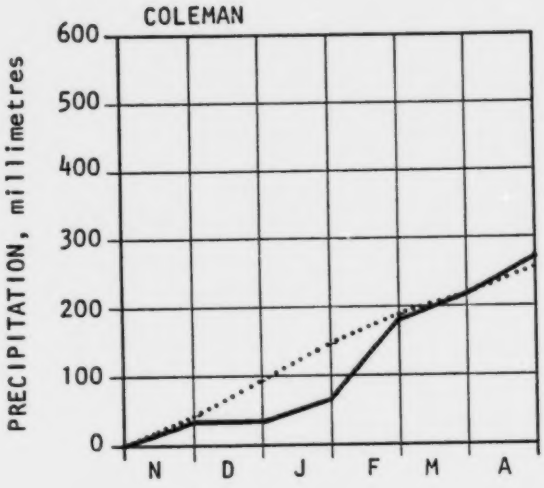
Station	May 1986 Forecast May-September Natural Flow Volume % of Average	1986 Actual May-September Natural Flow Volume % of Average
St. Mary River	77	67
Belly River	73	69
Waterton River	76	70
Oldman River near Brocket	75	74
Oldman River near Lethbridge	73	68

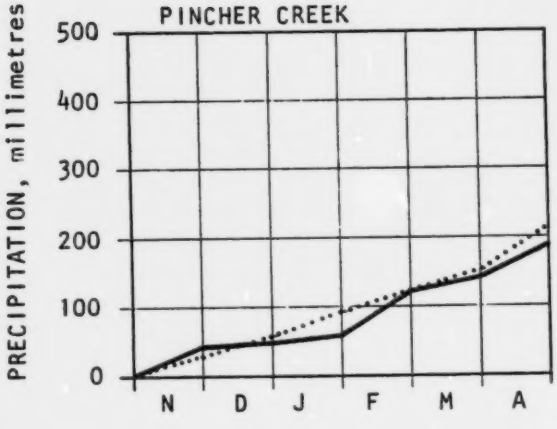
A more detailed presentation of the 1986 water supply conditions is given in Table 1.

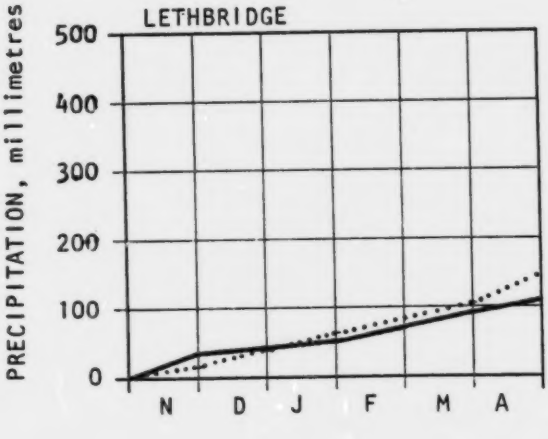
Water Storage Conditions

As of November 1, 1986, all major storage reservoirs in the basin were at normal levels, with the exception of the Waterton Reservoir. Waterton Reservoir was drawn on heavily to meet the high demand of water for irrigation during July and August, and to augment streamflow in the Oldman River through the City of Lethbridge in August. The reservoir did not recover its storage deficit to normal levels in the fall. A detailed account of the storage situation is presented in Table 2 and graphs of storage conditions in the basin between April 1st and October 31st are presented as Figure 25.









LEGEND

..... Average

——— 1985/86

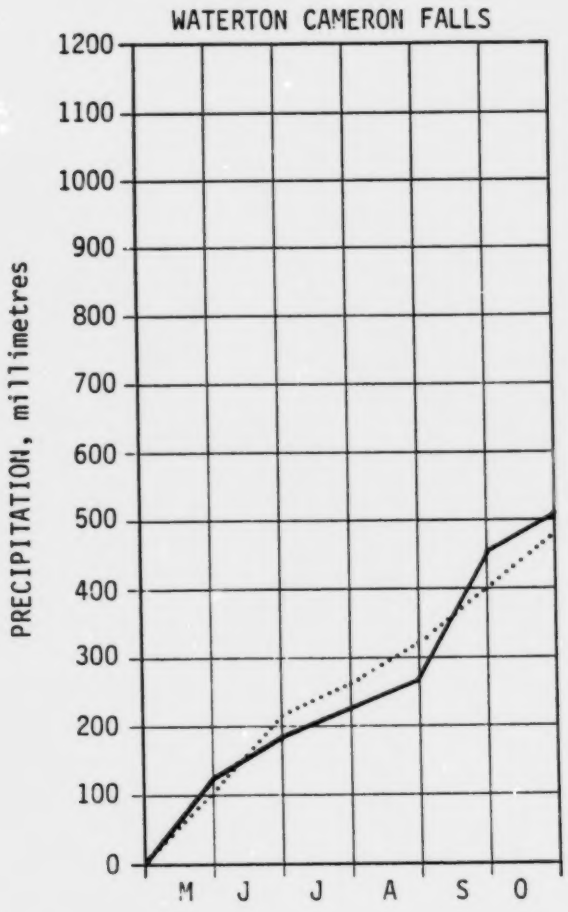
WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA

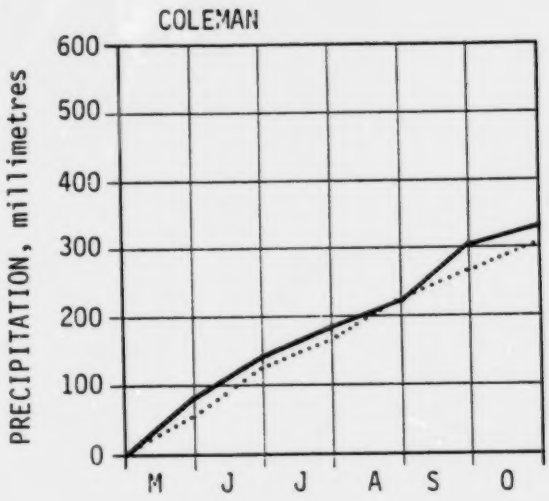
WINTER PRECIPITATION
OLDMAN RIVER BASIN

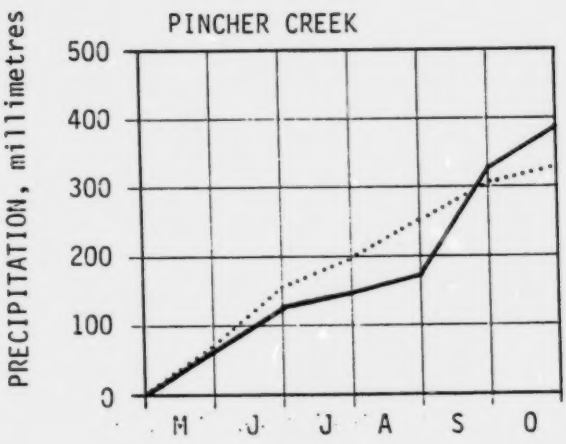
FIGURE 17 PAGE 30

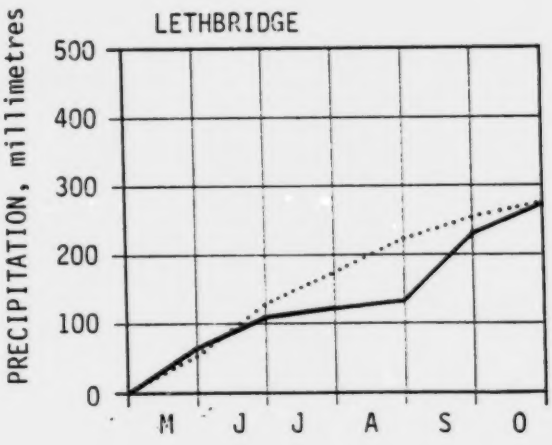
Alberta ENVIRONMENT

Water Resources









LEGEND

..... Average

——— 1986

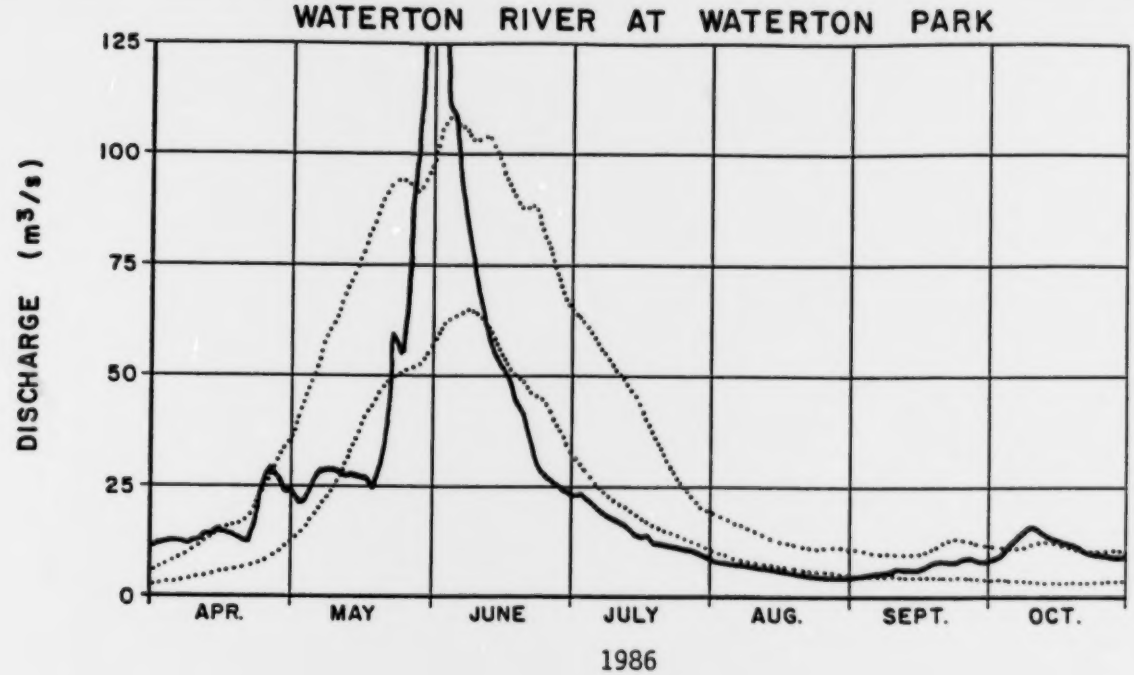
Alberta ENVIRONMENT

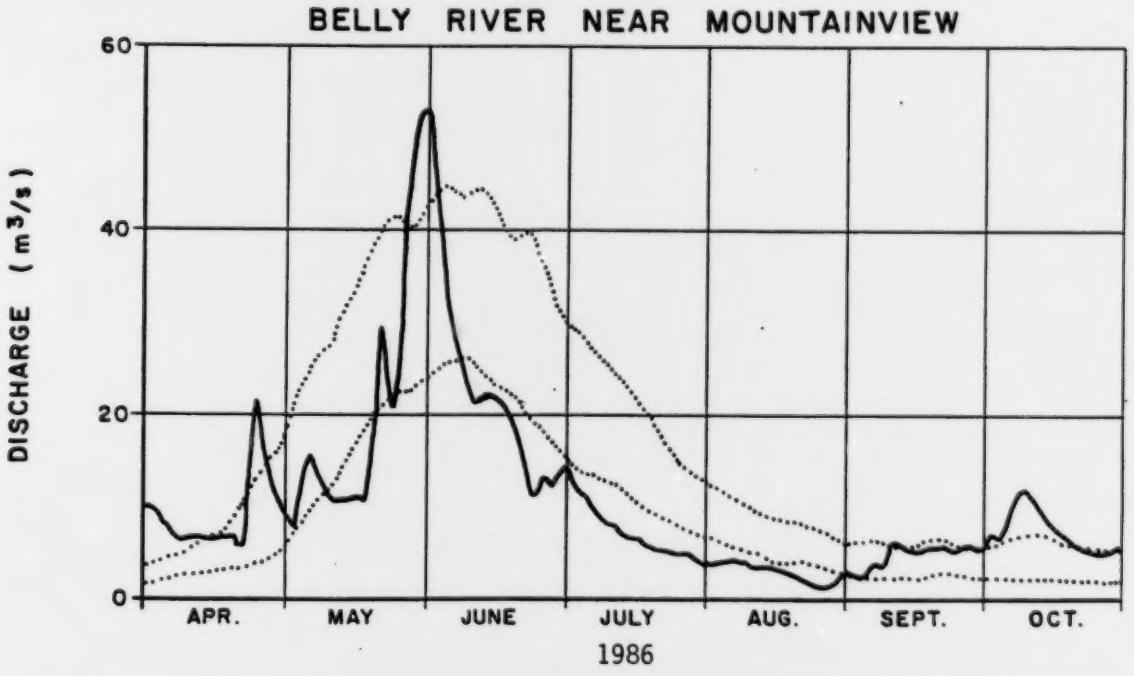
Water Resources

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA

SUMMER PRECIPITATION
OLDMAN RIVER BASIN

FIGURE 18



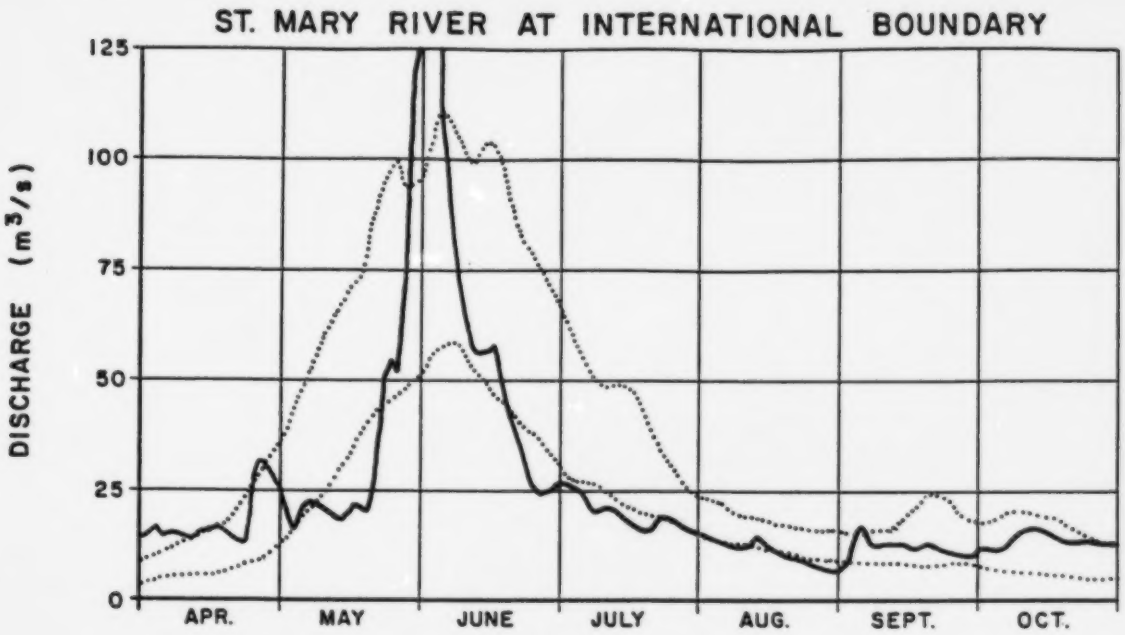


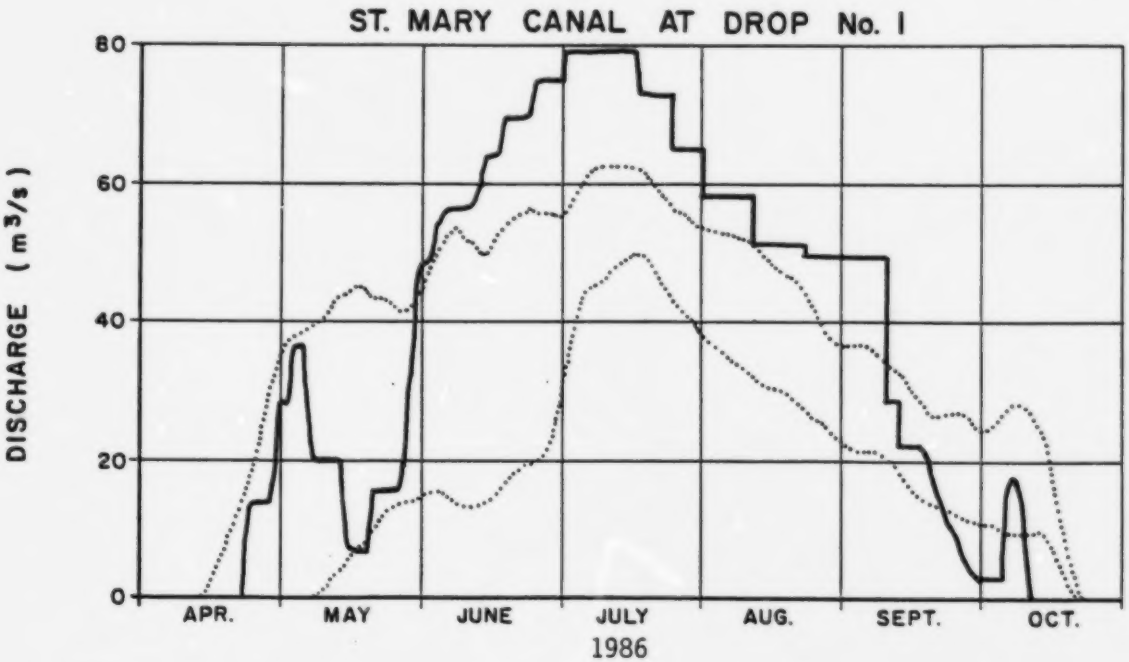
NOTE: Solid line indicates flow for current year; dotted lines show upper and lower quartile values for period of record as an indications of the range of normal behaviour.

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA
STREAMFLOW HYDROGRAPHS OLDMAN RIVER BASIN
FIGURE 19 PAGE 32

Alberta ENVIRONMENT

Water Resources



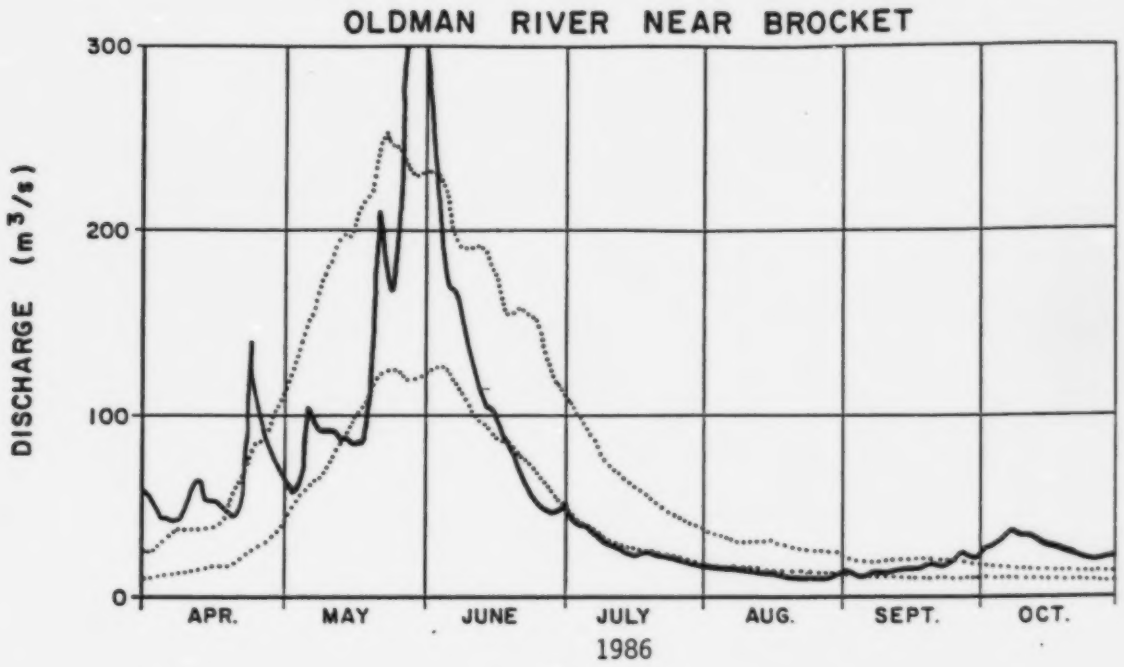


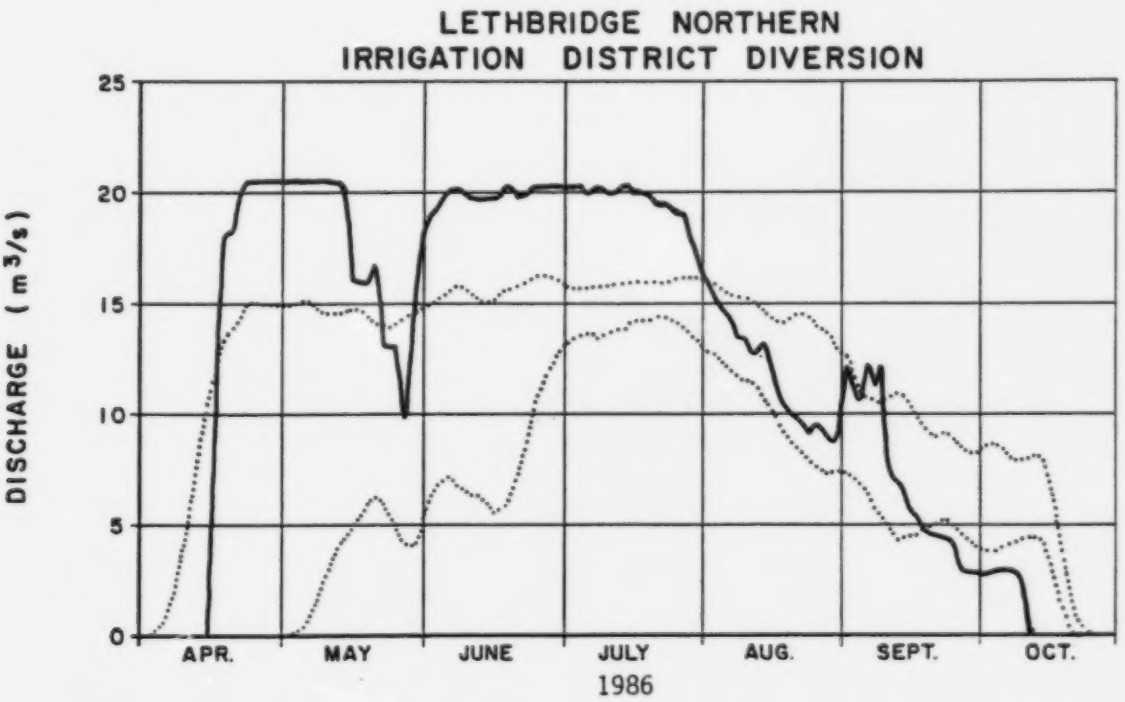
NOTE: Solid line indicates flow for current year; dotted lines show upper and lower quartile values for period of record as an indications of the range of normal behaviour.

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA
STREAMFLOW HYDROGRAPHS OLDMAN RIVER BASIN
FIGURE 20 PAGE 33

Alberta ENVIRONMENT

Water Resources



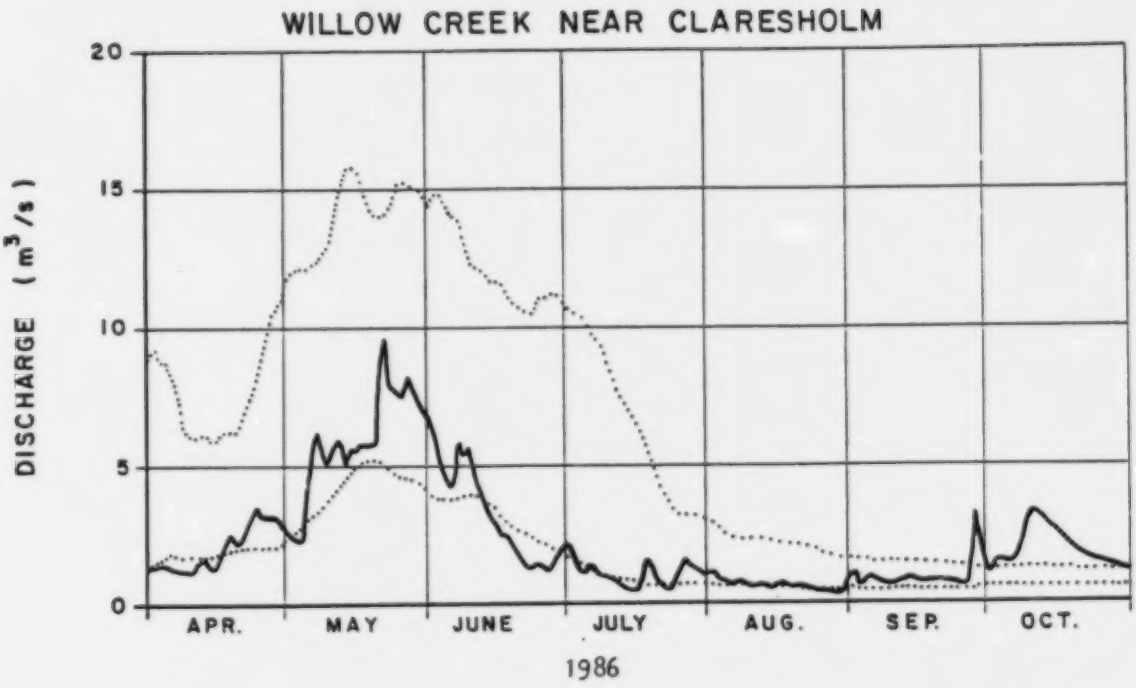


NOTE: Solid line indicates flow for current year; dotted lines show upper and lower quartile values for period of record as an indications of the range of normal behaviour.

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA
STREAMFLOW HYDROGRAPHS OLDMAN RIVER BASIN
FIGURE 21 PAGE 34

Alberta ENVIRONMENT

Water Resources



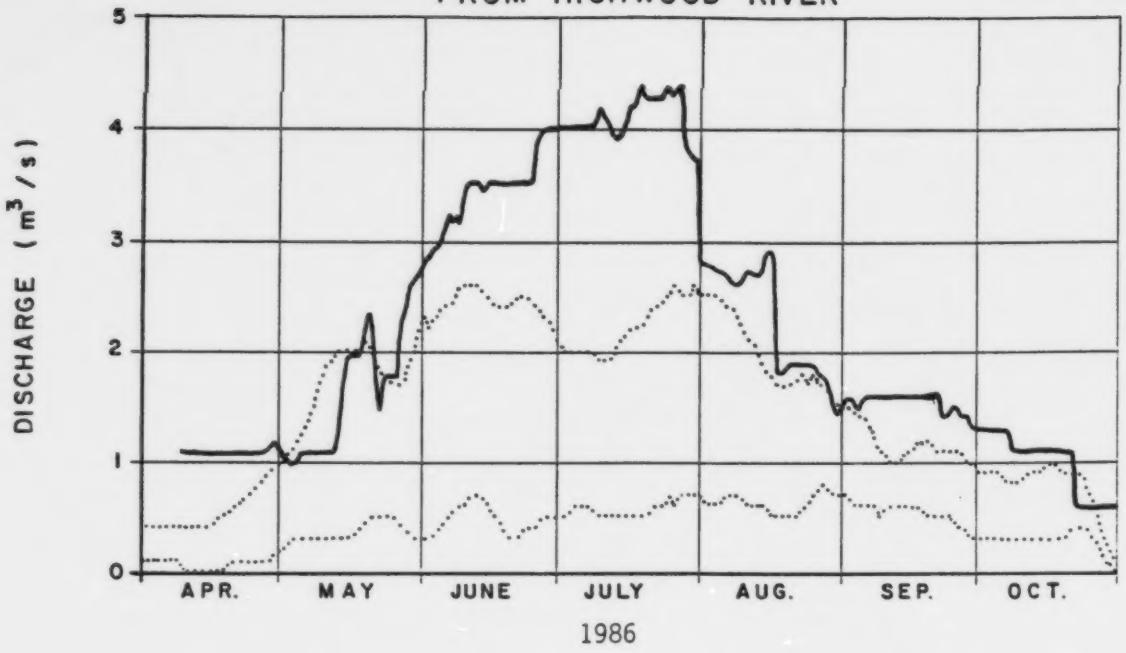
NOTE: Solid line indicates flow for current year; dotted lines show upper and lower quartile values for period of record as an indications of the range of normal behaviour.

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA	
STREAMFLOW HYDROGRAPHS OLDMAN RIVER BASIN	
FIGURE 22	PAGE 35

Alberta ENVIRONMENT

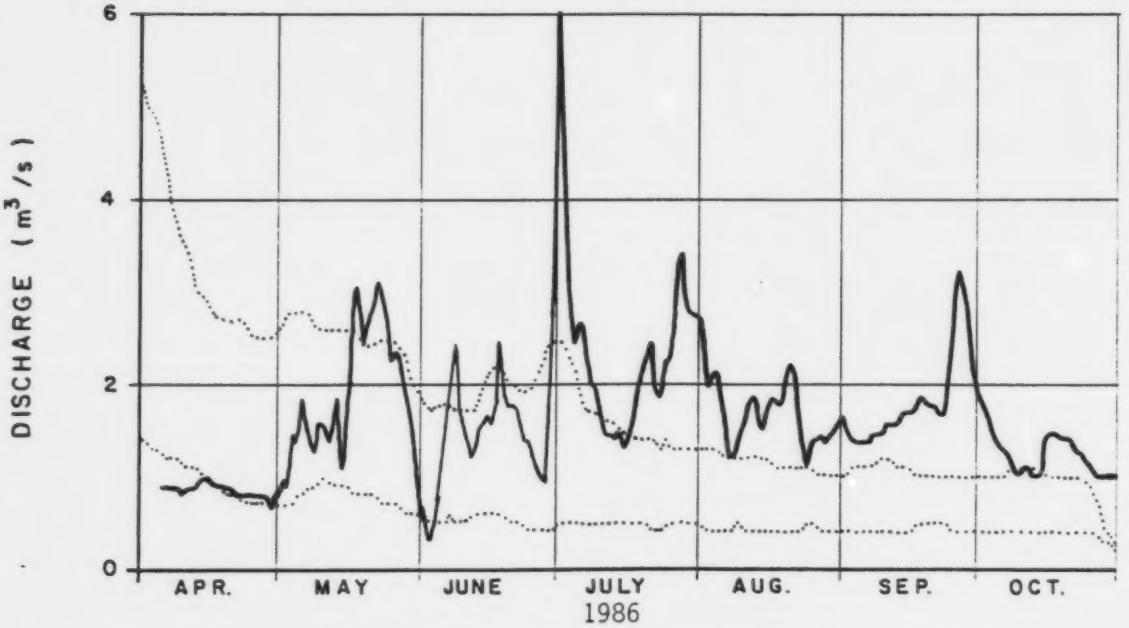
Water Resources

TOTAL DIVERSION TO LITTLE BOW RIVER FROM HIGHWOOD RIVER



1986

LITTLE BOW RIVER AT CARMANGAY



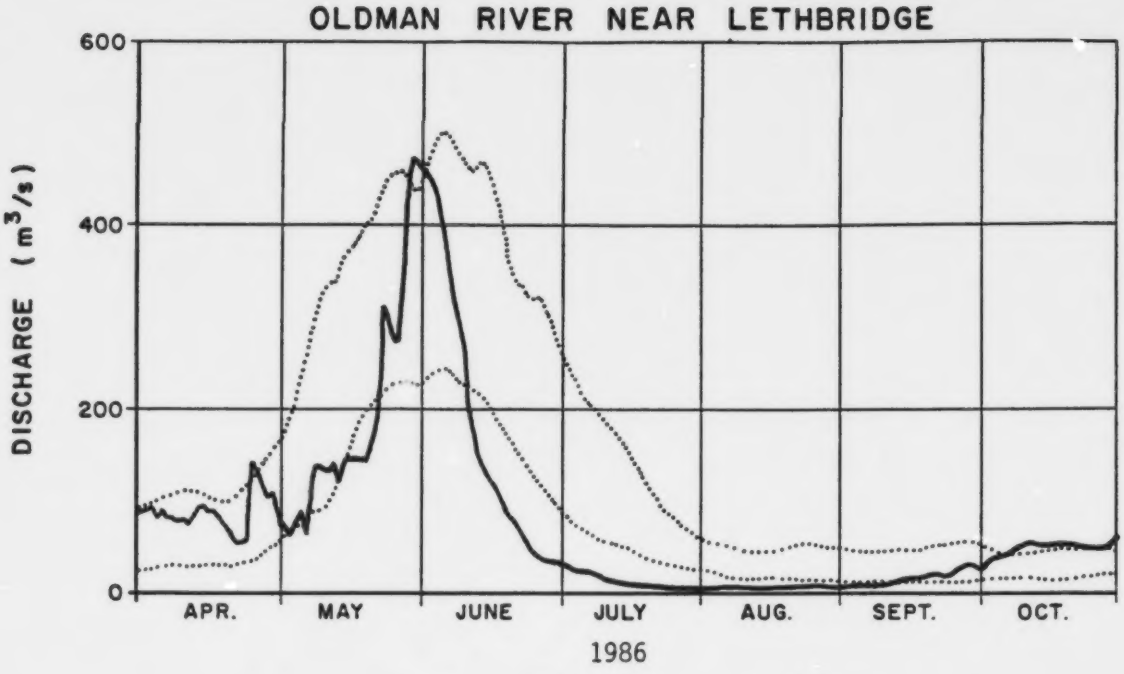
1986

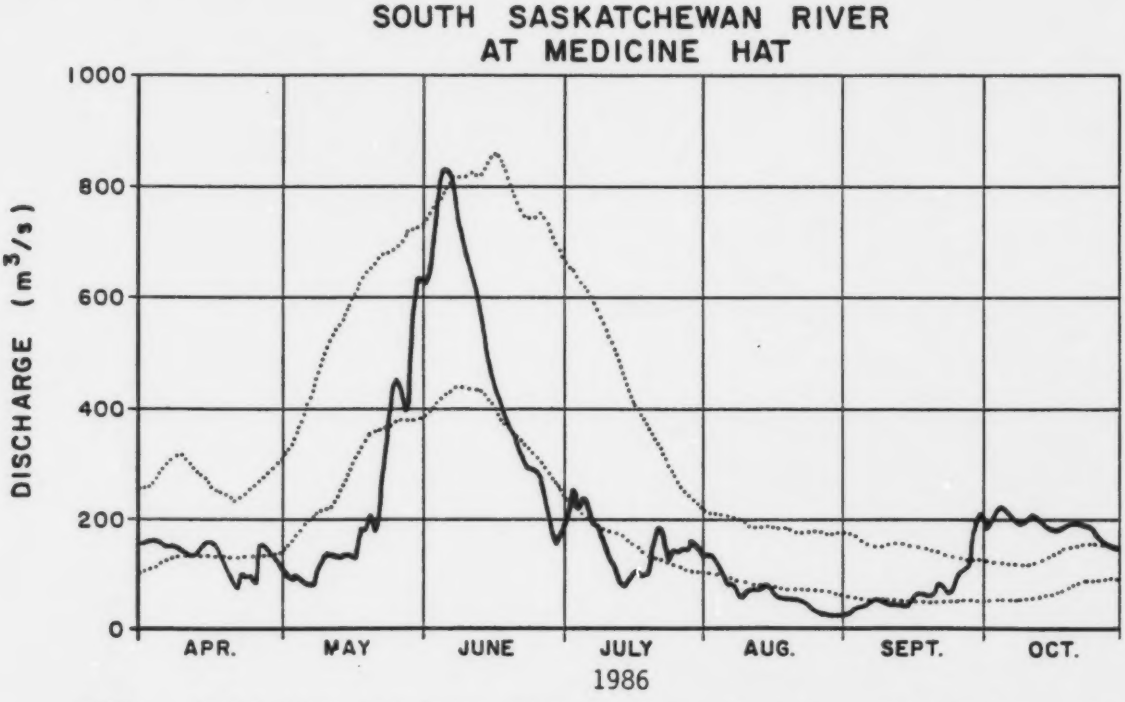
NOTE: Solid line indicates flow for current year; dotted lines show upper and lower quartile values for period of record as an indications of the range of normal behaviour.

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA
STREAMFLOW HYDROGRAPHS OLDMAN RIVER BASIN
FIGURE 23 PAGE 36

Alberta ENVIRONMENT

Water Resources



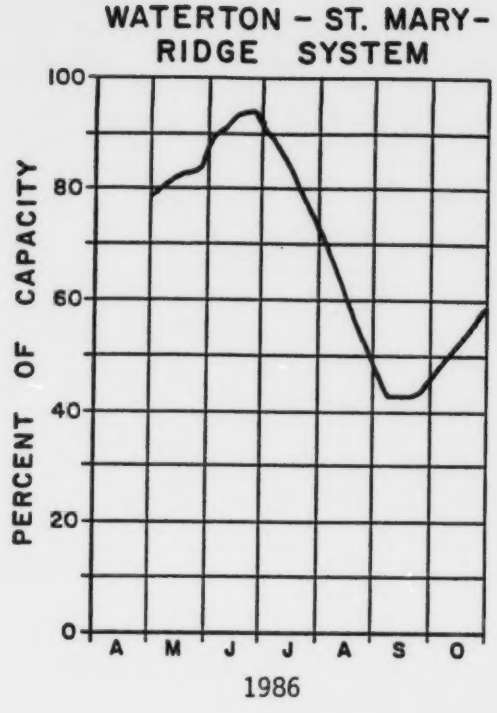


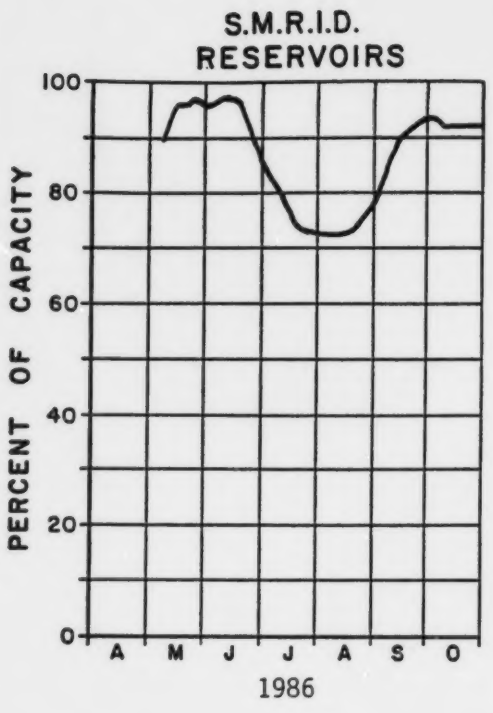
NOTE: Solid line indicates flow for current year; dotted lines show upper and lower quartile values for period of record as an indications of the range of normal behaviour.

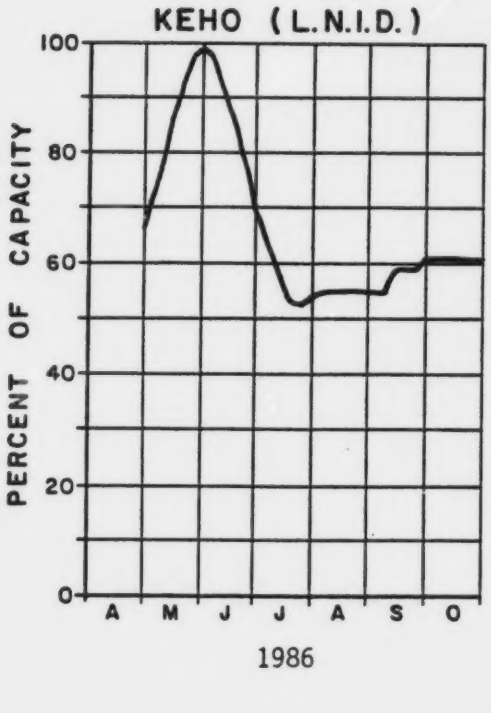
WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA
STREAMFLOW HYDROGRAPHS OLDMAN RIVER BASIN
FIGURE 24 PAGE 37

Alberta ENVIRONMENT

Water Resources







WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA

RESERVOIR STORAGE
OLDMAN RIVER BASIN

FIGURE 25

Alberta ENVIRONMENT
Water Resources

BOW RIVER BASIN

Weather Conditions during the Autumn of 1985 and the Winter of 1985/86

Autumn precipitation was above average throughout the basin, particularly in the Highwood River area. A storm in mid-September produced the highest flow conditions for the year of 1985 on both the Elbow and Highwood Rivers.

The month of November was extremely cold and marked the beginning of a trend of dry weather which persisted until mid-February. November 1985 was the second coldest November on record at both Banff and Calgary. December 1985 was the second driest December on record at Banff.

A trend of warm weather became established in mid-December. This trend persisted until early February. January was another record-setting month with Banff experiencing its warmest January on record. As a result of the warm weather in January and much below average snowfall from mid-November to the end of January, virtually all of the snow had disappeared in the plains areas of the basin by the end of January. The mountain snowpack at the end of this month was below average.

In mid-February, a major storm hit the basin, considerably improving snowpack conditions in the mountains and creating a new snowcover in the plains and lower foothills areas. About a week later, another storm system hit the basin, riding on a strong warm flow of moist air from the Pacific Ocean. This weather system dumped large amounts of snow in the headwaters of the basin and also caused a rapid melting of the snow from the previous storm in the plains and lower foothills areas. The same warm weather system caused spring runoff to occur in the plains areas of the basin during the last week of February, several weeks in advance of the usual time of occurrence. Virtually all of the plains area snowpack had again been depleted by the end of February.

Precipitation during March was generally close to average in the mountain areas and below average in the plains areas. Temperatures were well below average throughout the basin.

The plains area snowpack had generally melted by the end of the first week of March. Snowfall occurred later in the month but the new snow melted soon after it had fallen. The mountain snowpack ranged from average to slightly above average at the end of March.

April precipitation was generally below average at the lower elevation weather stations in the basin, but snowfall in the mountains at higher elevation was close to normal. Taken as a whole, the month was one of close to normal temperature. At the end of April, the mountain snowpack ranged from average to slightly above average.

Graphs of winter precipitation accumulation for a number of key climate stations from November 1, 1985 to April 30, 1986 are presented as Figure 26.

Weather Conditions during the Summer of 1986

Precipitation was above average throughout the basin in May. Cool wet weather dominated the first half of the month, reaching a climax with a late spring blizzard at mid-month which dumped large amounts of snow on the plains areas. After this event, the weather moderated and then turned hot and dry for the last week of the month.

This hot spell caused a rapid melting of the snowpack in the mountains,

creating high streamflow conditions for any river originating in the mountains. By the end of May, most of the mountain snowpack had melted although large patches of snow at higher elevations remained to melt in June.

In terms of weather, June was generally an uneventful month in the basin. Below average precipitation amounts occurred in the basin during June.

July precipitation was well above normal in the Bow river basin, although precipitation totals were less than that received to the north. The Bow River basin was an zone of transition between an area of almost no July precipitation to the south to an area of heavy July precipitation to the north. The basin recieved more precipitation in the form of scattered showers early in the month than it did from the large storm of mid-July. Precipitation for the month of July was 145% of average in Calgary, and 213% of average in Banff.

August was generally a dry month in the basin. It was very hot and sunny towards the end of August.

More rain came to the basin in September, and September was a wetter month than July at most locations in the basin. For example, precipitation in the month of September in Calgary was almost 50 mm more than in July, giving Calgary a monthly precipitation total in September which was 384% of average.

Graphs of precipitation accumulation for a number of key climate stations from May 1st to October 31st are presented as Figure 27. The southern watersheds of the Bow River basin received average amounts of precipitation until the month of September. The northern watersheds in the Bow River basin and the mainstem of the Bow River basin received above average May 1st to October 31st precipitation.

Streamflow Conditions

At the beginning of March, the rapid melting of new snow produced high streamflow levels in the Highwood River basin and in the Bow River downstream of Calgary. There was a danger of flooding at the Town of High River because of the high flow in the Highwood River and the formation of an ice jam in the river at the town. Fortunately the rate of streamflow subsided and serious flooding did not occur. The flow from the Highwood produced high streamflow in the Bow River as well. Work was temporarily halted on the reconstruction of the Bassano Dam while the flood wave passed. The Bow River upstream of Calgary was not much affected by the weather system responsible for this unusual event. By mid-month the flow of the Highwood was back within the normal range. Streamflow conditions throughout the Bow River basin were generally normal at the end of March.

By the end of April, rivers in the basin were well below normal because the mountain snowpack had not yet begun to melt significantly. Irrigation diversions began around the middle of the month. The Eastern Irrigation District began operations at the Bassano Dam on the 15th of April. The Western Irrigation District began diversions at Calgary on the 17th, and the diversion to the Bow River Irrigation District at the Carseland weir began on April 23rd.

River levels were below normal during the first half of May because of the cool weather but rose quickly during the last week of the month because of the melting of the mountain snowpack. The high levels during the last week of May in the Bow River caused some flooding at Banff, Canmore and several other locations between Banff and Calgary, and were a hazard for

boaters on the river. Natural flow during May was generally above average: 115 percent of average for both the Bow River at Calgary and the Highwood River.

The recession of streamflow on the mainstem of the Bow River in the month of June was not as rapid as that experienced on the Highwood and Elbow rivers largely because of the contribution glaciers make to streamflow in the Upper Bow River basin. Since June was a dry month, the Highwood and Elbow rivers had receded to below normal levels by month's end. The mainstem of the Bow River was flowing at normal levels at the end of June.

In comparison to rivers further north, the storms of July brought only a slight increase to streamflow in the Bow River basin. The response of the Bow River upstream of Calgary to the mid-July storm was a contributing factor to the maintenance of an adequate water supply to irrigation districts along the Bow River for the remainder of the season.

The irrigation diversion to the Western Irrigation District (WID) was relatively low throughout May because of the cool, wet weather and the mid-month blizzard. Diversion to the WID increased during June, July and August with the return of more seasonable weather. The rates of diversion at the Carseland weir and the Bassano Dam were relatively high during May, June and July.

The wet weather of September brought an early reduction in diversion for the WID and BRID. The Western Irrigation District's diversion at Calgary ended on September 25th, and the diversion to the Bow River Irrigation District (BRID) at the Carseland weir ended on September 30th. The Eastern Irrigation District (EID) continued diversions until October 10th.

Hydrographs for key river and irrigation canal stations are presented in Figures 28 to 31.

Water Supply Volume for 1986

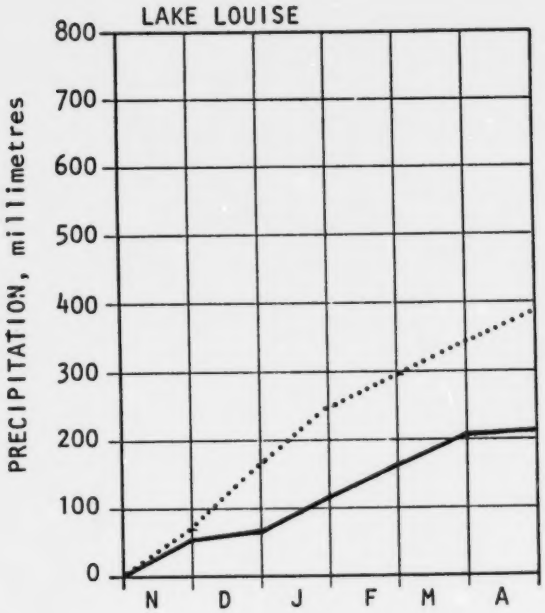
As of May 1, 1986, the water supply outlook for the basin for the May 1st to September 30th period called for close to average streamflow volumes. The table which follows presents the May volume forecasts of natural streamflow for the principal locations and tributaries in the basin along with the actual seasonal volumes for 1986 for comparison.

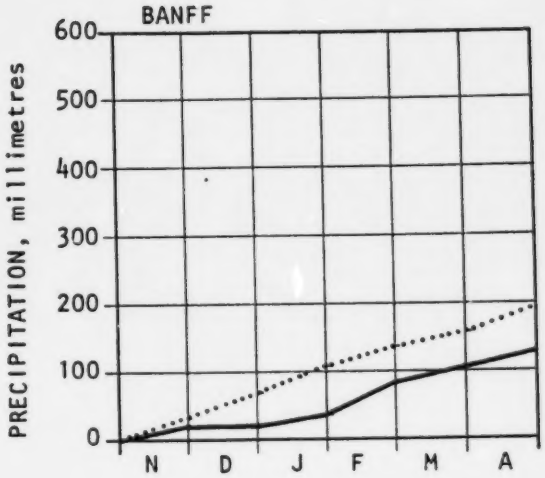
Station	May 1986 Forecast May-September Natural Flow Volume % of Average	1986 Actual May-September Natural Flow Volume % of Average
Bow River at Banff	108	112
Bow River at Calgary	106	105
Elbow River	107	89
Highwood River	110	68
Lake Minnewanka Inflow	106	106
Spray Lake Inflow	108	101
Kananaskis River	100	104

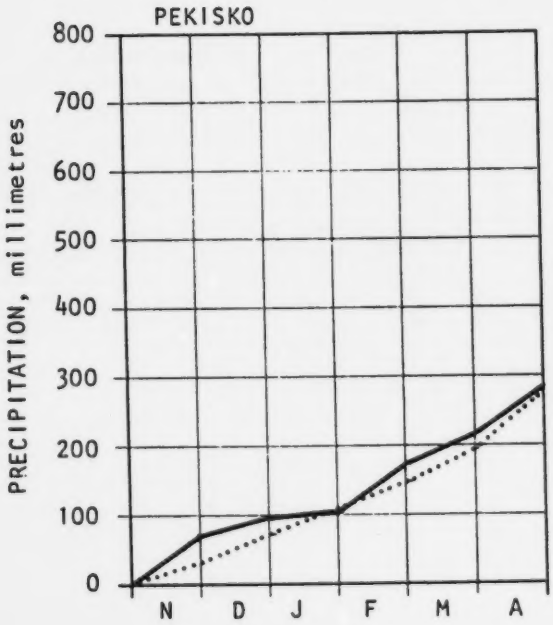
A more detailed presentation of the natural flow volumes of 1986 is given in Table 1.

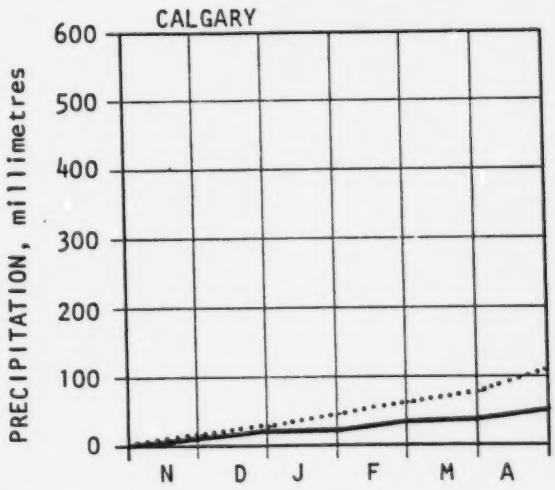
Water Storage Situation

As of November 1, storage conditions were normal for most of the reservoirs in the basin. A detailed account of the storage situation as of November 1, 1986 is presented in Table 2. Graphs of total storage for a number of reservoir systems in the basin are provided in Figure 32.









LEGEND

..... Average

——— 1985/86

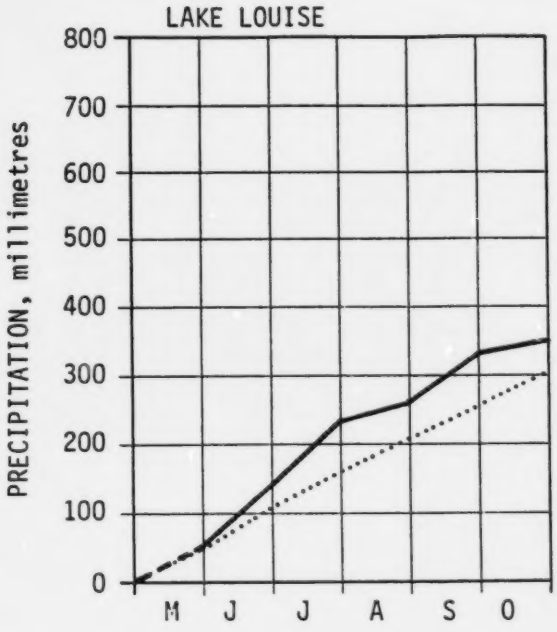
Alberta ENVIRONMENT

Water Resources

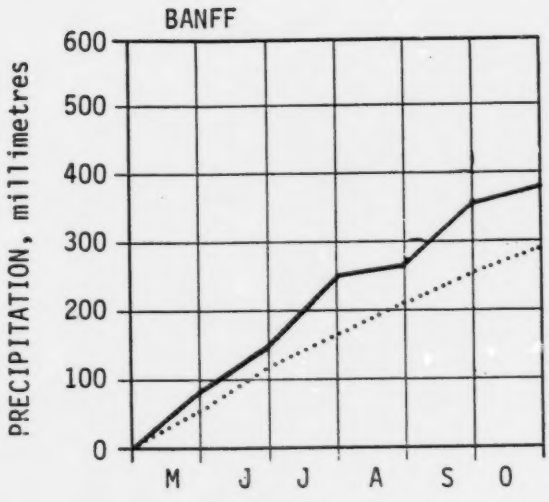
WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA

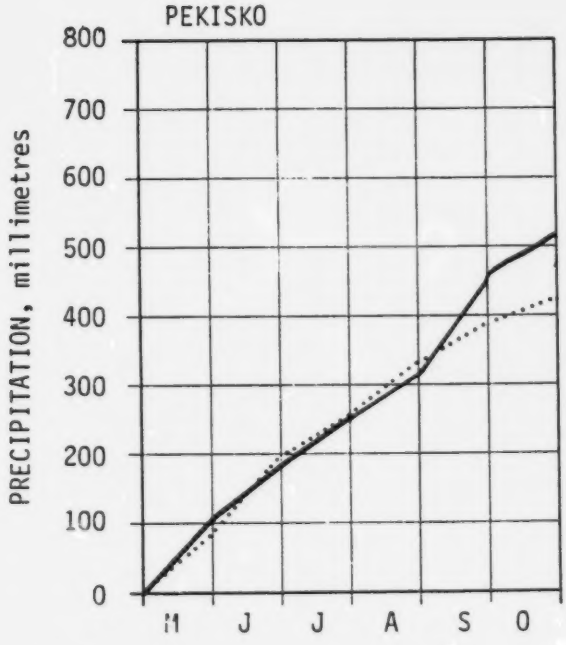
WINTER PRECIPITATION
BOW RIVER BASIN

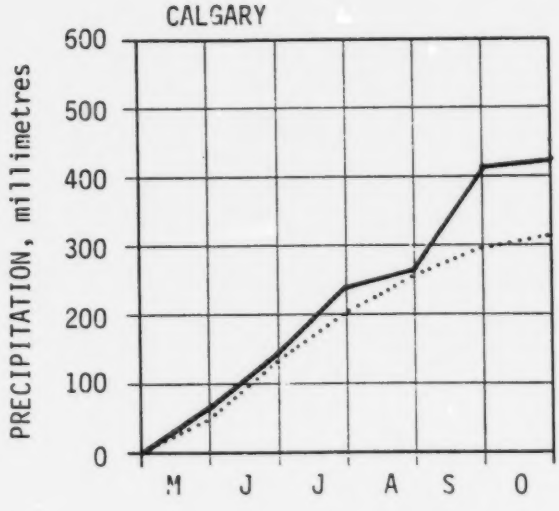
FIGURE 26 PAGE 43



*May precipitation estimated for Lake Louise.







LEGEND

..... Average

——— 1986

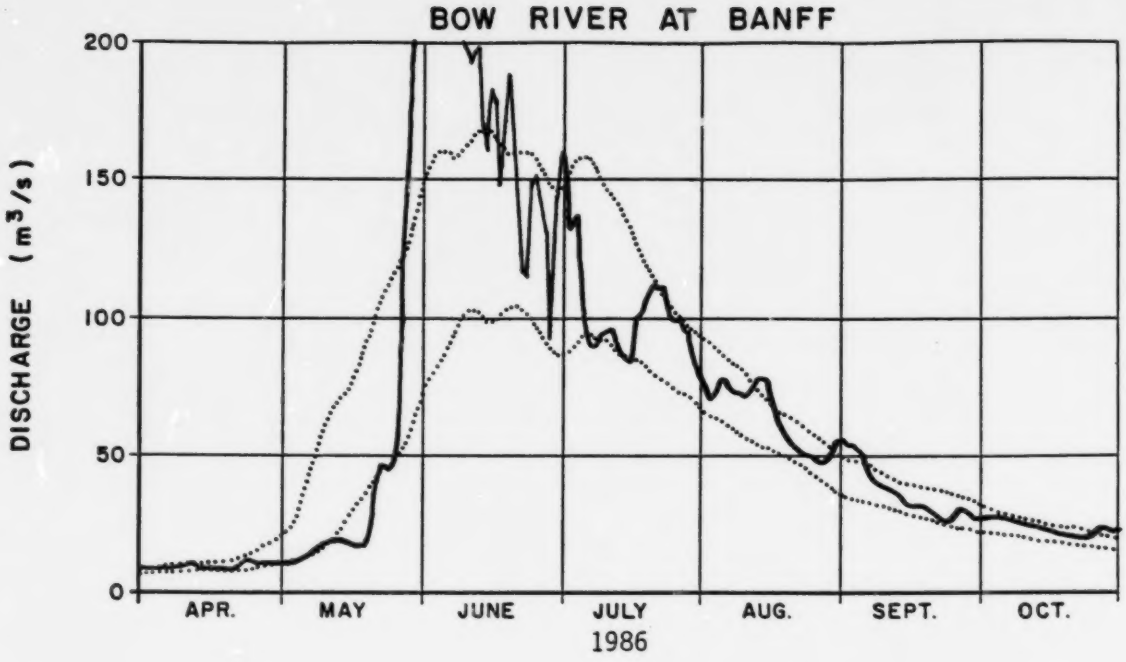
WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA

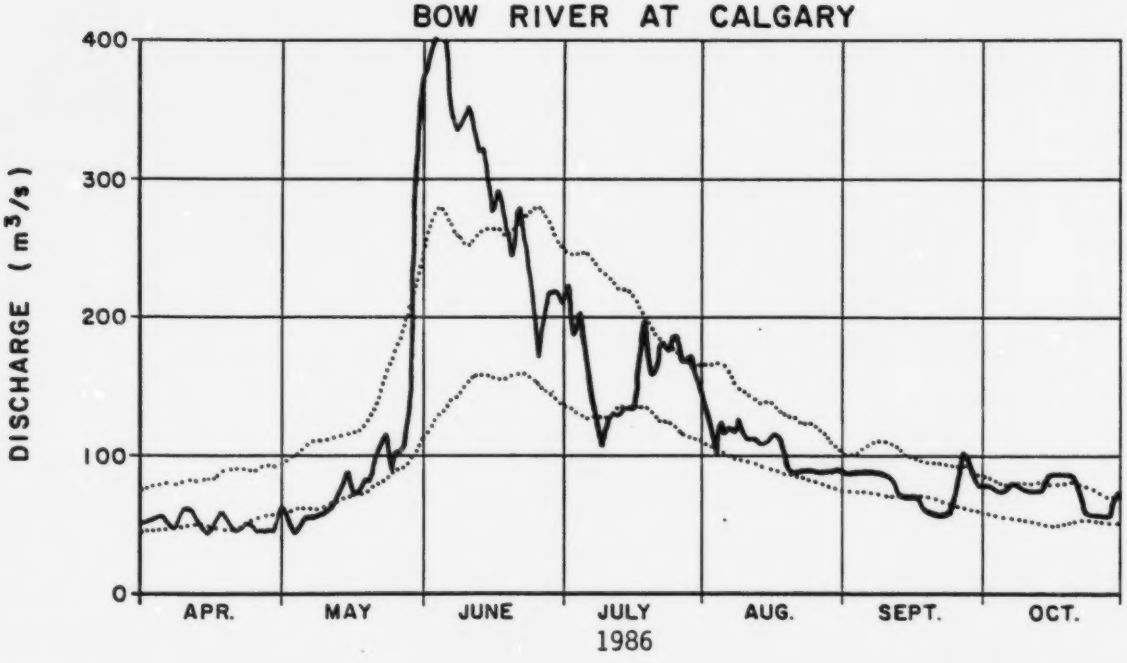
SUMMER PRECIPITATION
BOW RIVER BASIN

FIGURE 27 PAGE 44

Alberta ENVIRONMENT

Water Resources



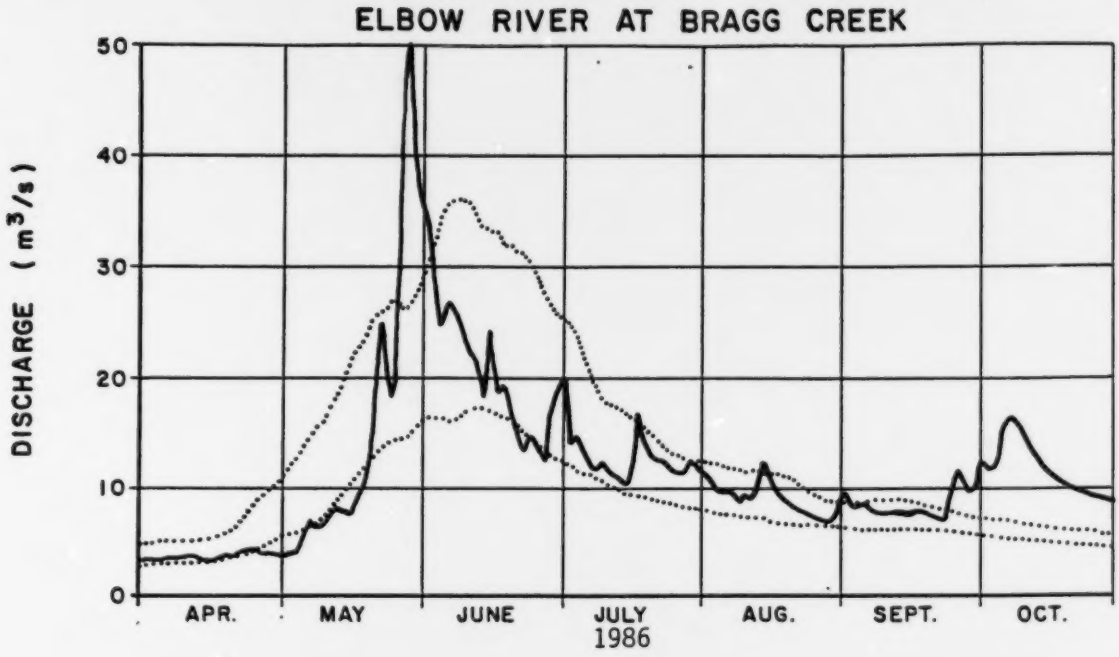


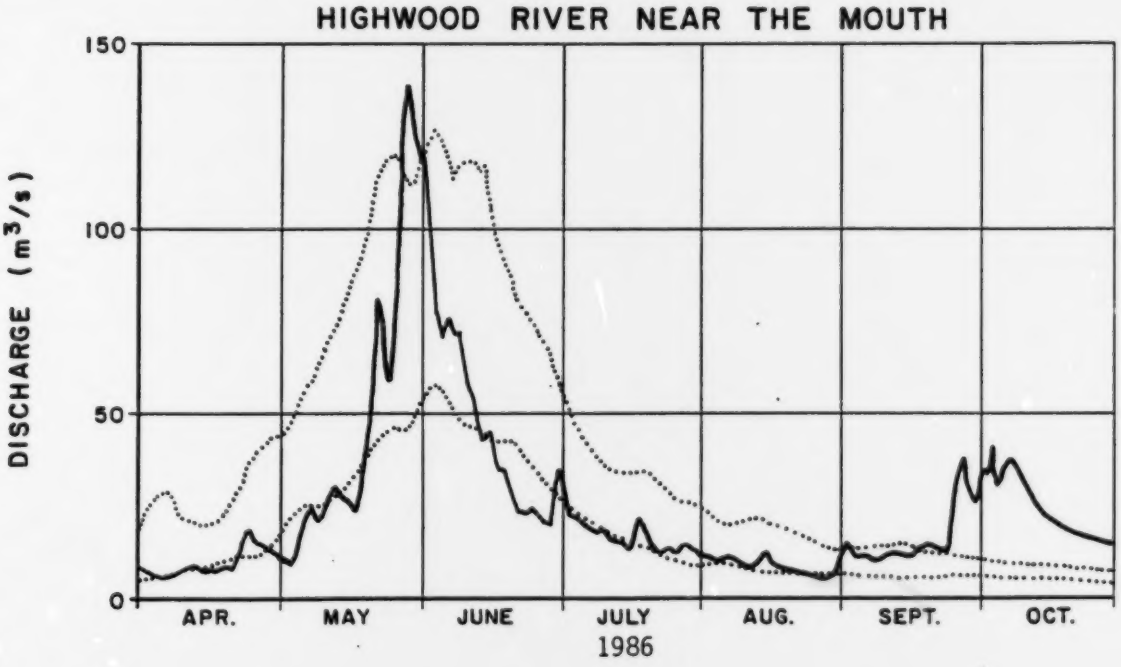
NOTE: Solid line indicates flow for current year; dotted lines show upper and lower quartile values for period of record as an indications of the range of normal behaviour.

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA	
STREAMFLOW HYDROGRAPHS BOW RIVER BASIN	
FIGURE 28	PAGE 45

Alberta ENVIRONMENT

Water Resources



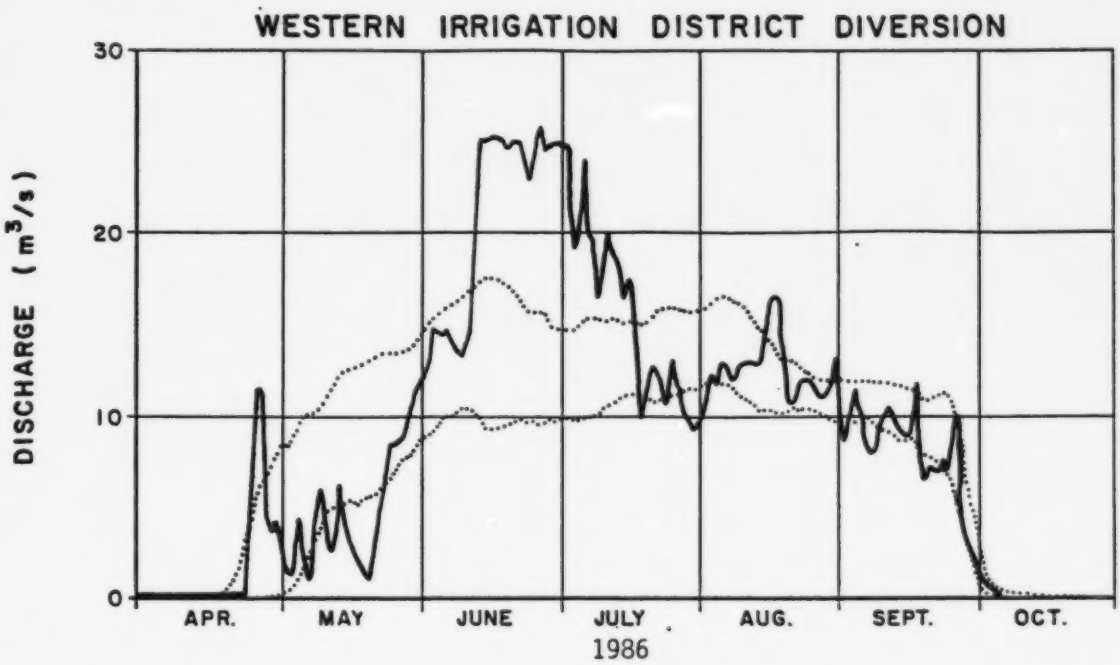


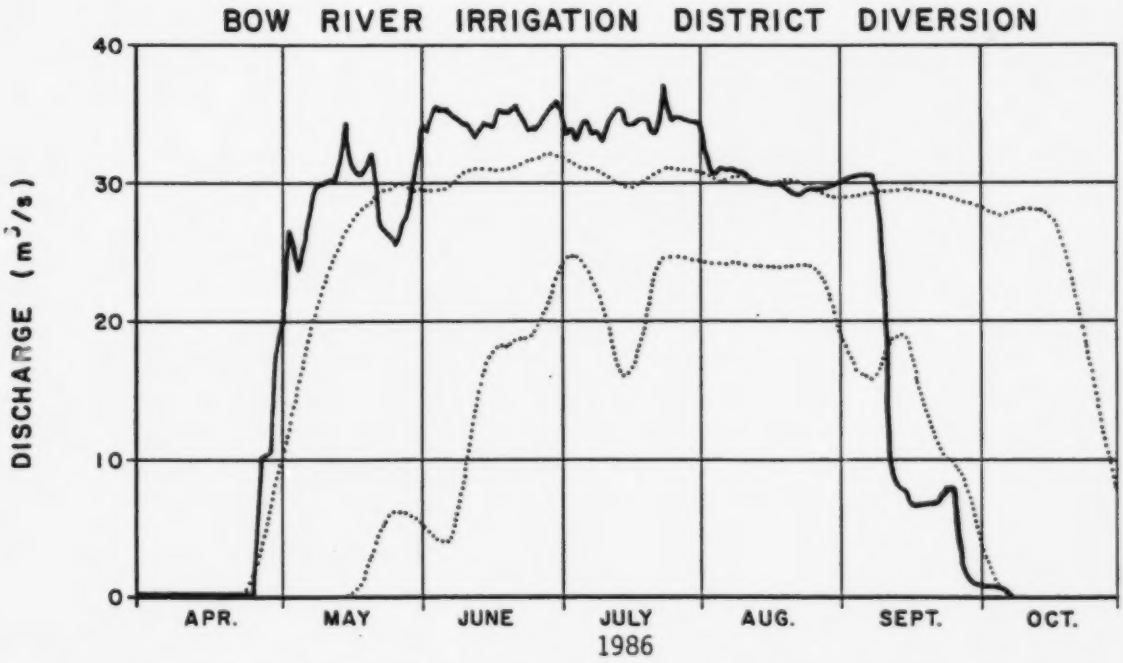
NOTE: Solid line indicates flow for current year; dotted lines show upper and lower quartile values for period of record as an indications of the range of normal behaviour.

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA	
STREAMFLOW HYDROGRAPHS BOW RIVER BASIN	
FIGURE 29	PAGE 46

Alberta ENVIRONMENT

Water Resources





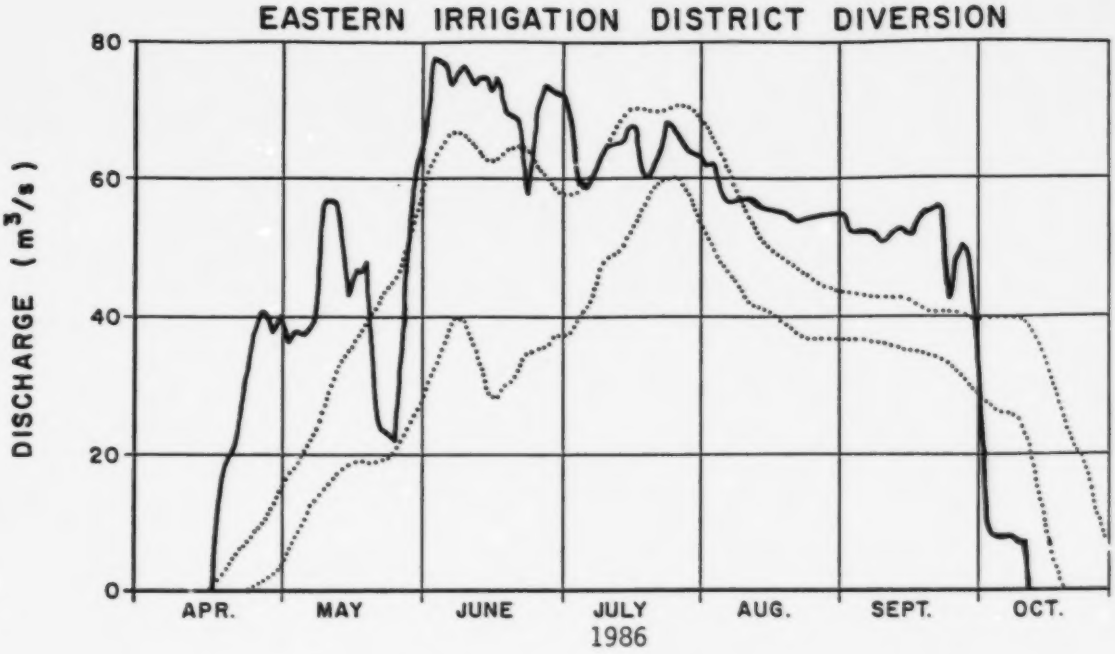
NOTE: Solid line indicates flow for current year; dotted lines show upper and lower quartile values for period of record as an indications of the range of normal behaviour.

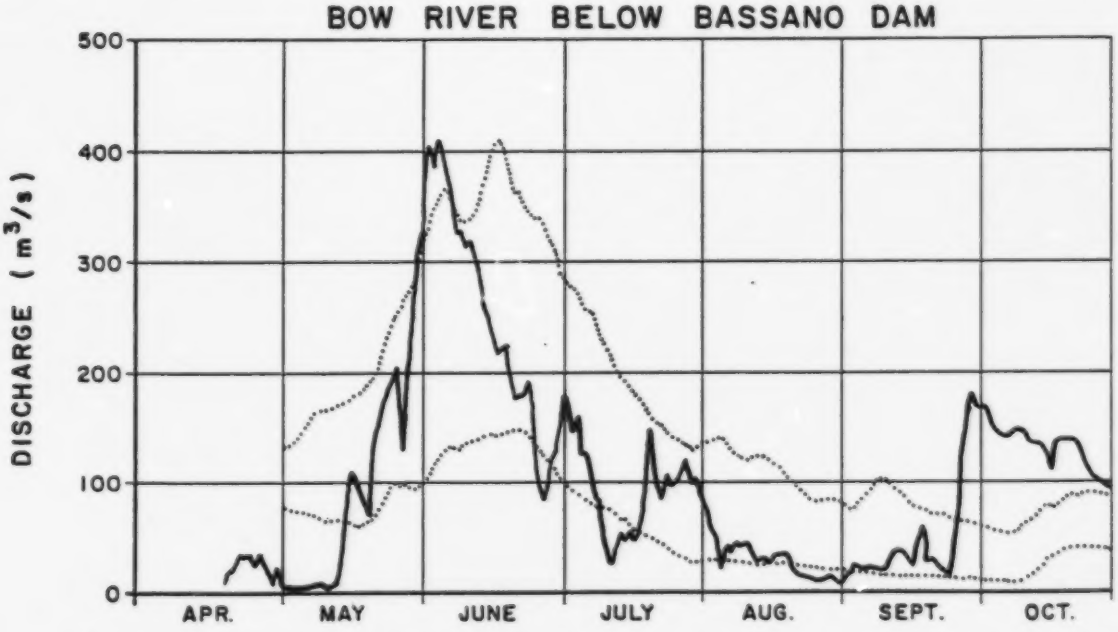
WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA

STREAMFLOW HYDROGRAPHS
BOW RIVER BASIN

FIGURE 30

Alberta ENVIRONMENT
Water Resources

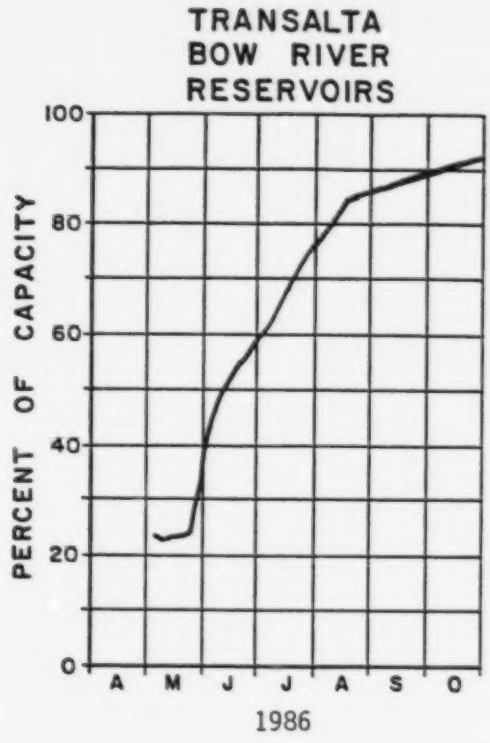


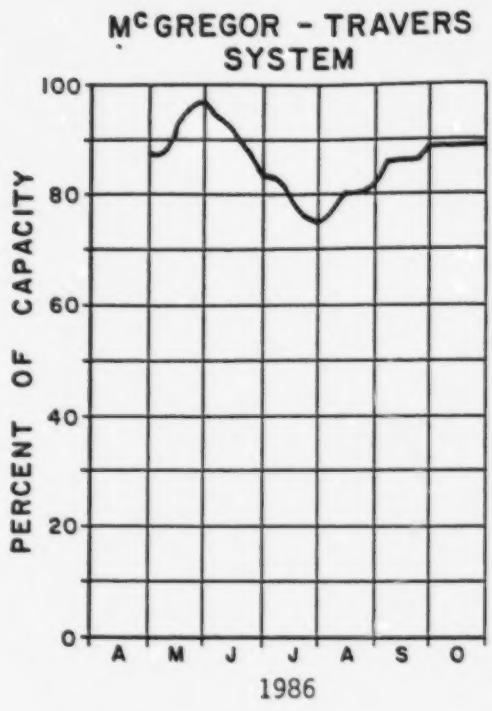


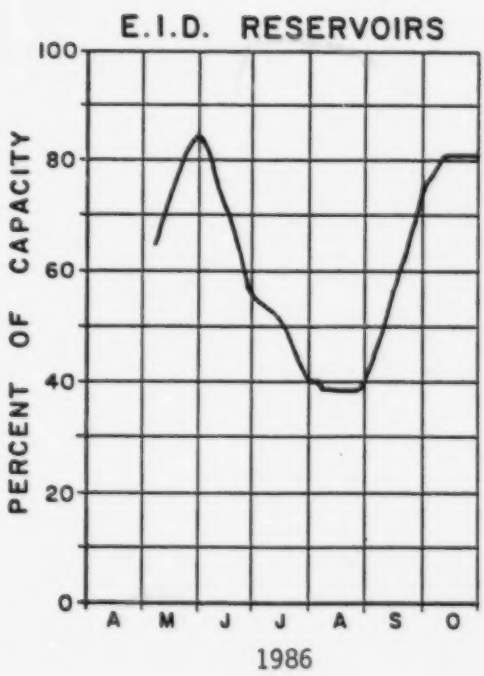
NOTE: Solid line indicates flow for current year; dotted lines show upper and lower quartile values for period of record as an indications of the range of normal behaviour.

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA
STREAMFLOW HYDROGRAPHS BOW RIVER BASIN
FIGURE 31 PAGE 48

Alberta ENVIRONMENT Water Resources







WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA

RESERVOIR STORAGE
BOW RIVER BASIN

FIGURE 32

Alberta ENVIRONMENT
Water Resources

RED DEER RIVER BASIN

Weather Conditions during the Autumn of 1985 and the Winter of 1985/86

Precipitation during September and October was much above average in the headwaters of the basin. November was extremely cold. The weather turned milder in mid-December and temperatures were much above average in January. A new record high monthly average temperature was set at Red Deer in January. From mid-November to the end of January, precipitation was much below average throughout the basin. By the end of January, very little snow remained in the plains areas of the basin because of the lack of winter snowfall and the warm weather of January.

Spring runoff came early to the basin in 1986. The same warm weather system which produced heavy snowfalls in the headwaters of the Oldman and Bow River basins and snowmelt flood conditions in the Milk, Oldman and Highwood River basins, melted most of the remaining plains area snowpack during the last week of February. Spring runoff volumes and river levels were generally below average.

Precipitation during March ranged from slightly below average in the mountain headwaters to slightly above average in the plains areas. Temperatures were generally much above average.

Most of the snow in the plains areas had melted by the end of the first week of March. Some new snow fell during the month but melted soon after it had fallen. At the end of March, the mountain snowpack was slightly above average for the time of year.

Precipitation during April was generally below average in the plains areas and slightly above average in the mountainous region of the basin. Temperatures were above average during the first and third weeks of the month, below average during the second week, and close to normal during the last week.

The mountain snowpack increased during April and was rated as above average at the end of the month.

Graphs of precipitation accumulation for the climate stations at Sundre, Red Deer and Drumheller for the winter period of November 1, 1985 to April 30, 1986 are presented in Figure 33.

Weather Conditions during the Summer of 1986

May precipitation was above average throughout the basin. The blizzard at mid-month dumped large amounts of snow on the plains areas. Temperatures were below average during the first half of the month but moderated soon after the blizzard.

As in other areas of southern and central Alberta, the last week of May was one of extremely hot weather which resulted in rapid melting of the mountain snowpack and high streamflow levels for mountain-fed rivers. By the end of May, most of the mountain snowpack had melted although large pockets of snow remained at higher elevations to melt in June.

Precipitation for the month of June was generally normal for climate stations located in the Red Deer river basin. The majority of the rainfall in June occurred at the end of the month. July was a particularly wet month throughout the basin. Heavy precipitation which caused flooding fell from July 16th to 19th. Monthly precipitation totals for the City of Red Deer and the Town of Sundre were 244% and 181% of average respectively for the month of July. August was a dry month in the basin and precipitation was

well below normal. September was a wet month, and the basin was hit by yet another storm at month's end. Monthly precipitation totals for the City of Red Deer and the Town of Sundre were 270% and 287% of average respectively in September. October was a month of generally below average rainfall on the basin.

Graphs of precipitation accumulation for the climate stations at Sundre, Red Deer and Drumheller for the period May 1 to October 31, 1986 are presented in Figure 34.

Streamflow Conditions

At the beginning of March, the levels of the plains area streams were generally receding after the spring runoff period in the last week of February.

Spring runoff in the plains area of the basin was generally below average. Most of the runoff came in the last week of February and the first week of March, several weeks earlier than normal. River conditions were generally close to normal throughout the basin in March.

River levels were slightly above average at the beginning of April and receded to normal levels by mid-month. The mountain snowpack did not melt significantly during the month so that river levels remained relatively low at the end of April.

River levels were below average during the first half of May but rose to above average levels by the end of the month in response to the rapid melting of the mountain snowpack. Plains area streams were relatively low in early May but experienced a third period of spring snowmelt runoff for 1986 after the mid-month blizzard. Natural flows were generally much above average for the month with the natural flow in the Red Deer River at Red Deer being 153 percent of average.

June was generally a period of streamflow recession in the Red Deer River basin. The mainstem of the Red Deer River had returned to normal levels by the third week of June. A storm at the end of June brought streamflow levels up once again. River levels in Red Deer River as a result of this storm were not nearly as high as that experienced in late May, or as high as that which occurred in mid-July. The mid-July storm caused flooding on tributaries of the Red Deer river upstream of Red Deer. Natural streamflow in the Red Deer River at Red Deer in July was 196% of average.

The Red Deer River receded throughout August only to come up once again in response to showery weather at the beginning of September and the major storm which occurred at the end of September. No flooding occurred as a result of the September storm. Streamflow on the Red Deer River remained well above average throughout the month of October.

Figure 35 presents hydrographs for the Red Deer River stations below Burnt Timber Creek and at Red Deer.

Water Supply Volume 1986

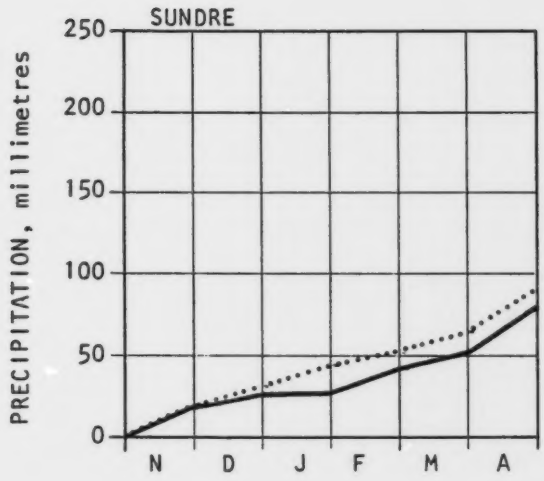
As of May 1, 1986, the natural streamflow volume of the Red Deer River for the period May 1st to September 30th was expected to be above average. The table which follows shows the May forecasts for the basin as well as the actual May to September natural flow volumes in 1986.

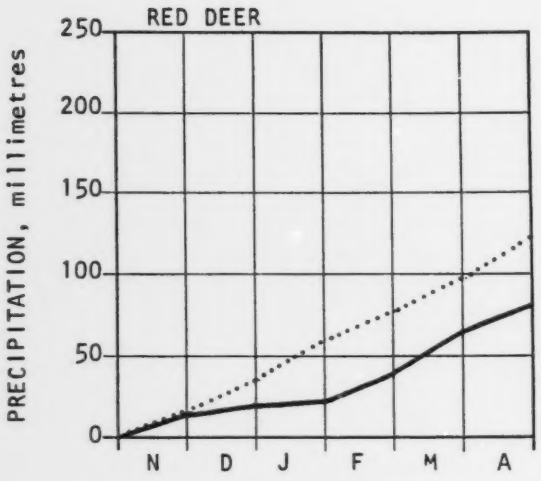
Station	May 1986 Forecast May-September Natural Flow Volume % of Average	1986 Actual May-September Natural Flow Volume % of Average
Gleniffer Lake Inflow (Dickson Dam)	120	143
Red Deer River at Red Deer	115	142

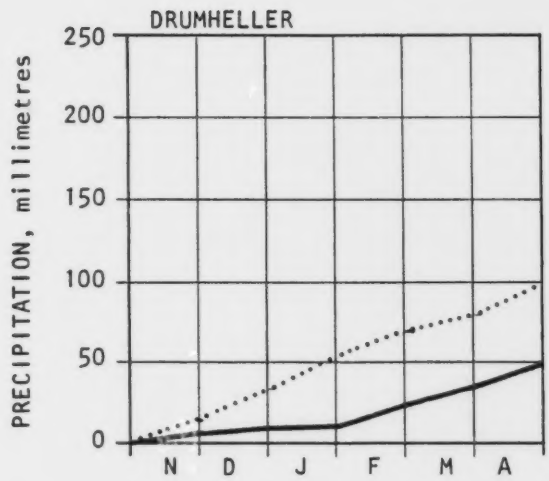
A more detailed presentation of the natural flow volumes for 1986 is provided in Table 1.

Water Storage Situation

With flow conditions as high as they were, there was no problem in filling Gleniffer Lake to its normal fall operating level in 1986. A graph of the storage condition of the lake from April 1 to October 31, 1986 is presented as Figure 36. On November 1, 1986, the storage level in Gleniffer Lake was normal for the time of year. A more detailed account of the storage situation is provided in Table 2.







LEGEND

..... Average

——— 1985/86

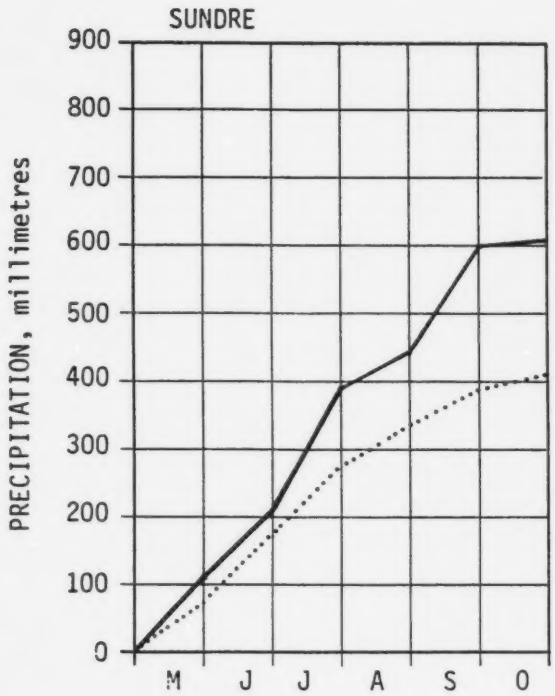
Alberta ENVIRONMENT

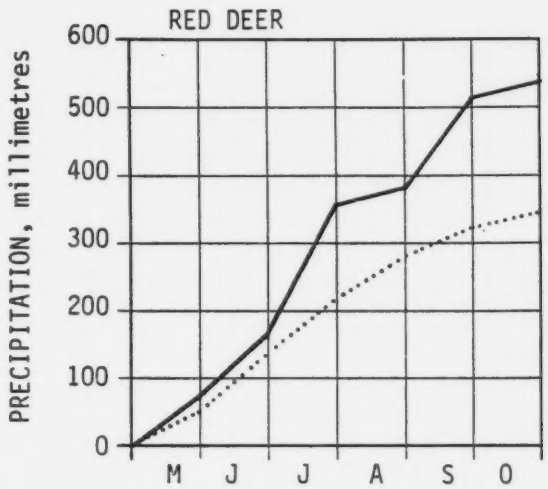
Water Resources

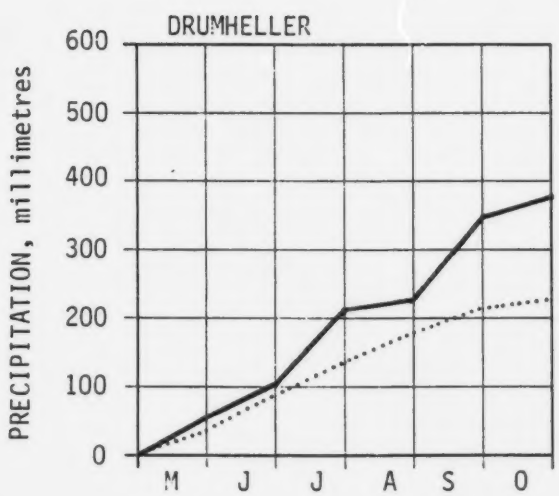
WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA

WINTER PRECIPITATION
RED DEER RIVER BASIN

FIGURE 33







LEGEND

..... Average

——— 1986

Alberta ENVIRONMENT

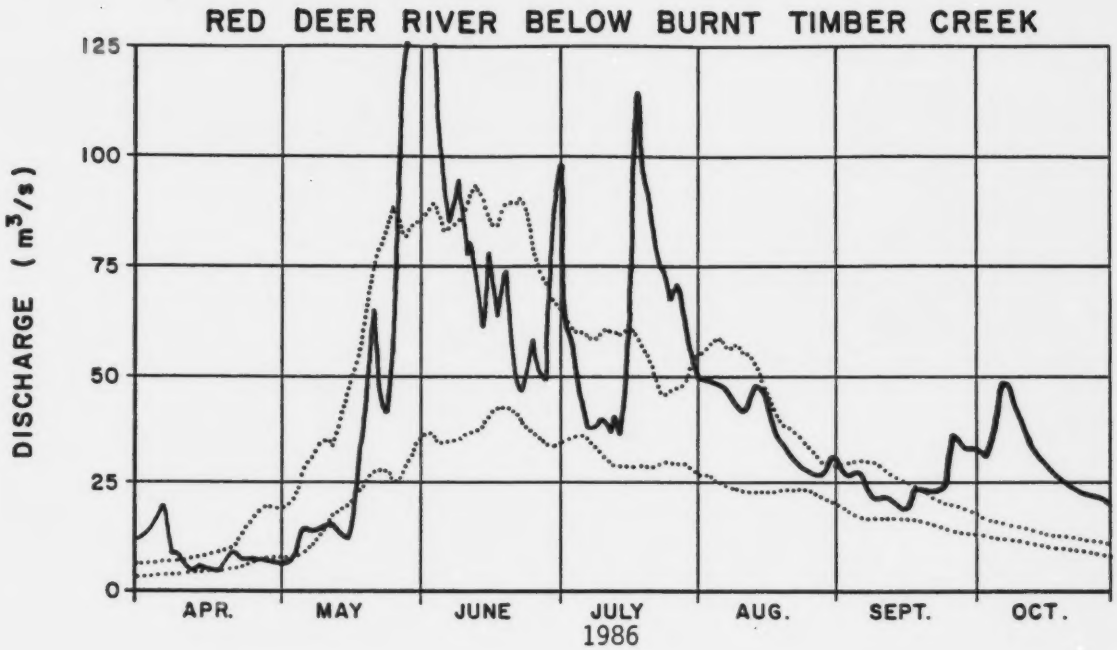
Water Resources

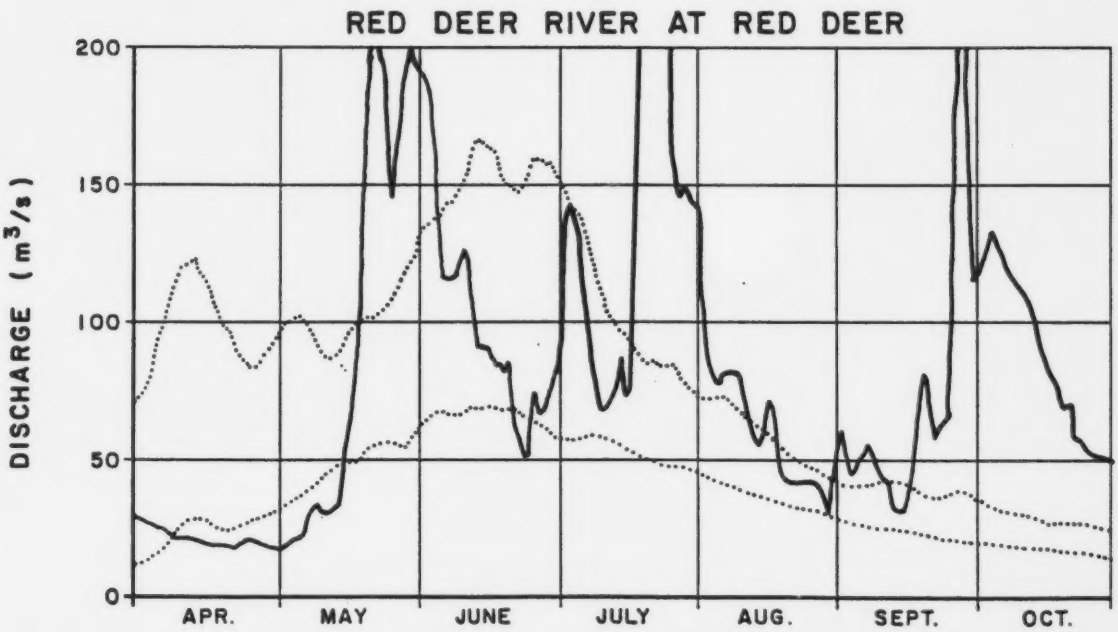
WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA

SUMMER PRECIPITATION

RED DEER RIVER BASIN

FIGURE 34

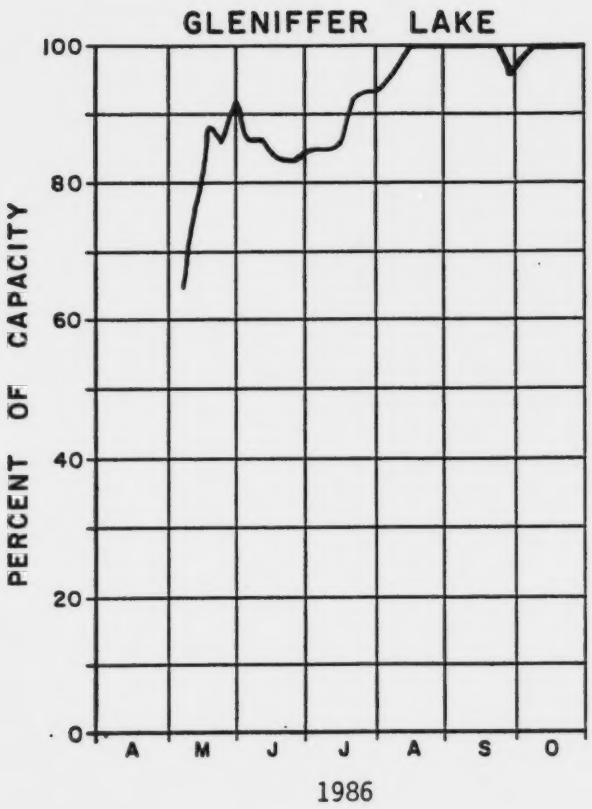




NOTE: Solid line indicates flow for current year; dotted lines show upper and lower quartile values for period of record as an indications of the range of normal behaviour.

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA
STREAMFLOW HYDROGRAPHS RED DEER RIVER BASIN
FIGURE 35 PAGE 55

Alberta ENVIRONMENT Water Resources



WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA

RESERVOIR STORAGE
RED DEER RIVER BASIN

FIGURE 36

Alberta ENVIRONMENT
Water Resources

NORTH SASKATCHEWAN RIVER BASIN

Weather Conditions during the Autumn of 1985 and the Winter of 1985/86

Precipitation was above average throughout most of the basin in September and October of 1985.

A period of extreme cold became established in early November and persisted until mid-December. January was a month of much above average temperatures, and some of the existing plains area snowpack was depleted during the month as a result.

A trend of below average precipitation became established in early November and lasted until the end of February. Winter precipitation from the beginning of November to the end of February was only 60 to 80 percent of average in the basin.

Warm weather during the last week of February caused the beginning of spring runoff in the plains areas much earlier than normal. A return to more seasonal temperatures in early March brought a halt to the process but very little snow remained by that time.

Precipitation during March was generally below average in the headwaters of the basin but above average in the plains areas. Temperatures were above average throughout the basin for most of the month.

April precipitation was generally below average in the basin although the Edmonton area received above normal precipitation, mostly in the form of rain. Temperatures for the month as a whole were close to seasonal norms.

The mountain snowpack condition at the end of April remained above average in spite of reports of below average precipitation during April at weather stations in the headwaters.

Graphs of precipitation accumulation for several key climate stations for the period from November 1, 1985 to April 30, 1986 are presented as Figure 37.

Weather Conditions during the Summer of 1986

Precipitation was generally close to average in the basin for the month of May. The mid-month blizzard which greatly affected other parts of central and southern Alberta did not have as much of an effect in the North Saskatchewan River basin. During this storm, the precipitation fell as rain north of Leduc.

Temperature conditions were cool for the first half of May but changed to very hot during the last week of the month. The hot weather caused the snow in the mountains to melt rapidly.

As with the Red Deer River basin, precipitation in the North Saskatchewan basin was characterized by a dry June, an exceedingly wet July, a dry August and a wet September. The mid-July storm which caused severe flooding was centered in the the North Saskatchewan River basin near Nordegg, hence the impact of the mid-July storm in the North Saskatchewan basin was great.

Graphs of precipitation accumulation for several key climate stations for the May 1st to October 31st period are presented as Figure 38.

Streamflow Conditions

The streams in the North Saskatchewan River basin were not as greatly affected by the weather extremes of February as were the rivers further south. Some spring runoff occurred during the last week of February but river levels did not reach high levels as a result.

The level of the North Saskatchewan River at Edmonton was above average in early March as the result of some spring snowmelt runoff from the plains areas. By the middle of the month, the river was back to a more normal level. Additional plains area snowmelt runoff in the last week of the month again boosted the river level to above average at the end of the month.

The level of the North Saskatchewan was above average at the beginning of April. By mid-month, the rate of flow was within the normal range and remained so to the end of the month.

Unlike the other major rivers of central and southern Alberta, the level of the North Saskatchewan River was normal in early May. The river rose during the last week of the month in response to the mountain snowmelt but did not reach levels as high as those experienced on major rivers to the south, primarily because of regulation of the flow by the Bighorn and Brazeau Dams. The natural flow in the North Saskatchewan River at Edmonton was 123 percent of average in May.

Streamflow receded to normal levels in June. July was a month of much above normal streamflow for the mainstem and many tributaries of the North Saskatchewan river. Flooding was extensive throughout the basin as a result of the storm in mid-July. Natural streamflow at Edmonton for the month of July was 180% of average, and the river reached its highest level in the city of Edmonton since 1915.

Streamflow in the basin receded throughout August and well into Septemeber. Normal streamflow levels were maintained in Edmonton throughout the months of August and July. The September storm caused a rise in streamflow in the North Saskatchewan River, and streamflow remained above normal throughout October. The North Saskatchewan River basin was not as greatly effected by this September storm as basins located to the south.

Graphs of streamflow for the stations on the North Saskatchewan River at Rocky Mountain House and Edmonton are presented in Figure 39.

Water Supply Volume 1986

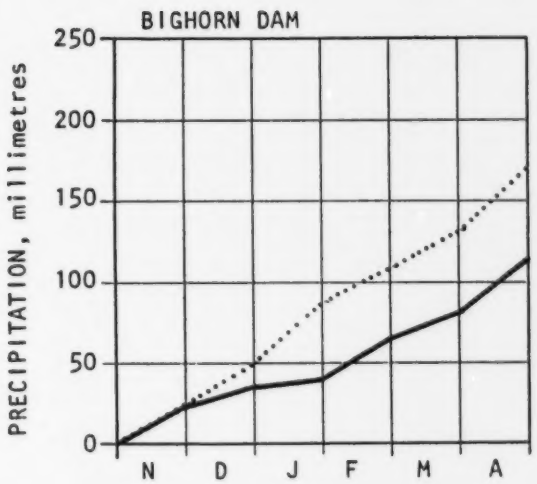
As of May 1, 1986 natural streamflow volumes for the May to September period were expected to be close to average for the North Saskatchewan River and its major tributaries. The table which follows presents the May 1986 forecast volumes as well as the May 1 to September 30 actual volumes.

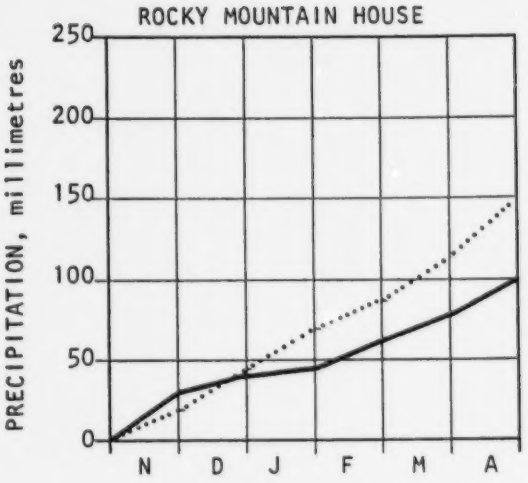
Station	May 1986 Forecast May-September Natural Flow Volume % of Average	1986 Actual May-September Natural Flow Volume % of Average
North Saskatchewan River at Bighorn Dam	100	105
Brazeau River at Brazeau Dam	100	132
North Saskatchewan River at Edmonton	95	126

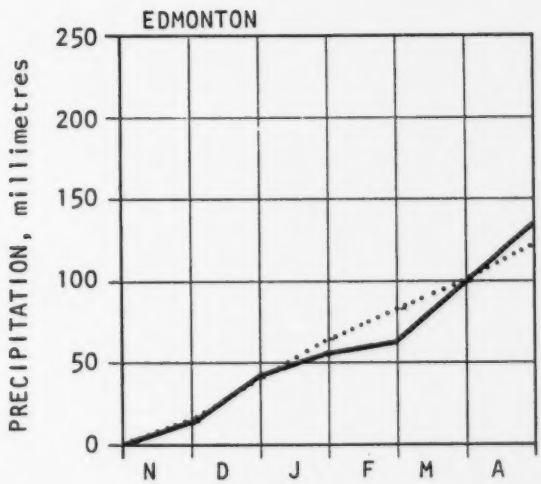
A detailed account of the natural flow volume is presented in Table 1.

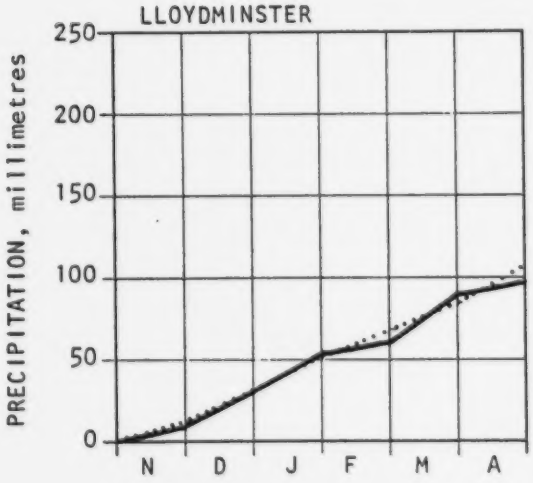
Water Storage Situation

Storage conditions in Lake Abraham and the Brazeau Reservoir were average as of November 1, 1986. A graph of the total storage in Lake Abraham and the Brazeau Reservoir between April 1 and October 31, 1986 is presented as Figure 40. A detailed account of the storage situation is given in Table 2.









LEGEND

..... Average

——— 1985/86

Alberta ENVIRONMENT

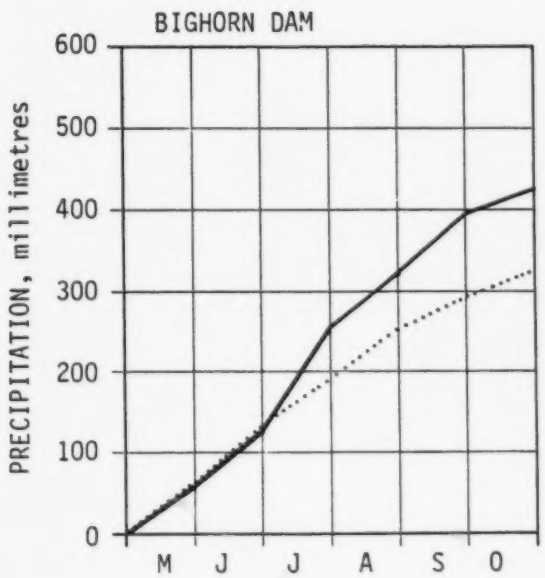
Water Resources

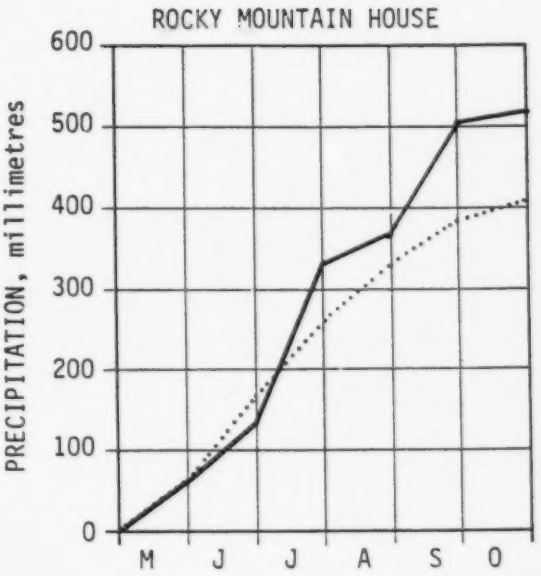
WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA

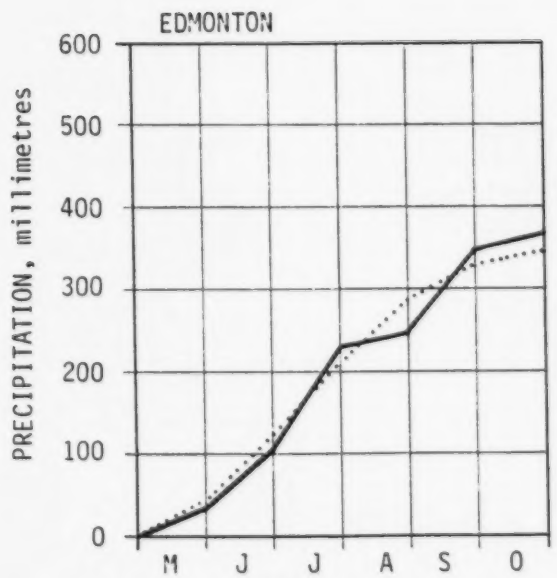
WINTER PRECIPITATION

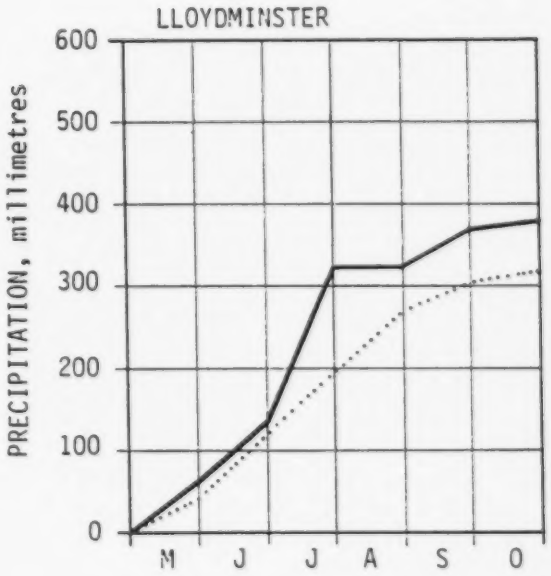
NORTH SASKATCHEWAN RIVER BASIN

FIGURE 37 PAGE 60









LEGEND

..... Average

——— 1986

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA

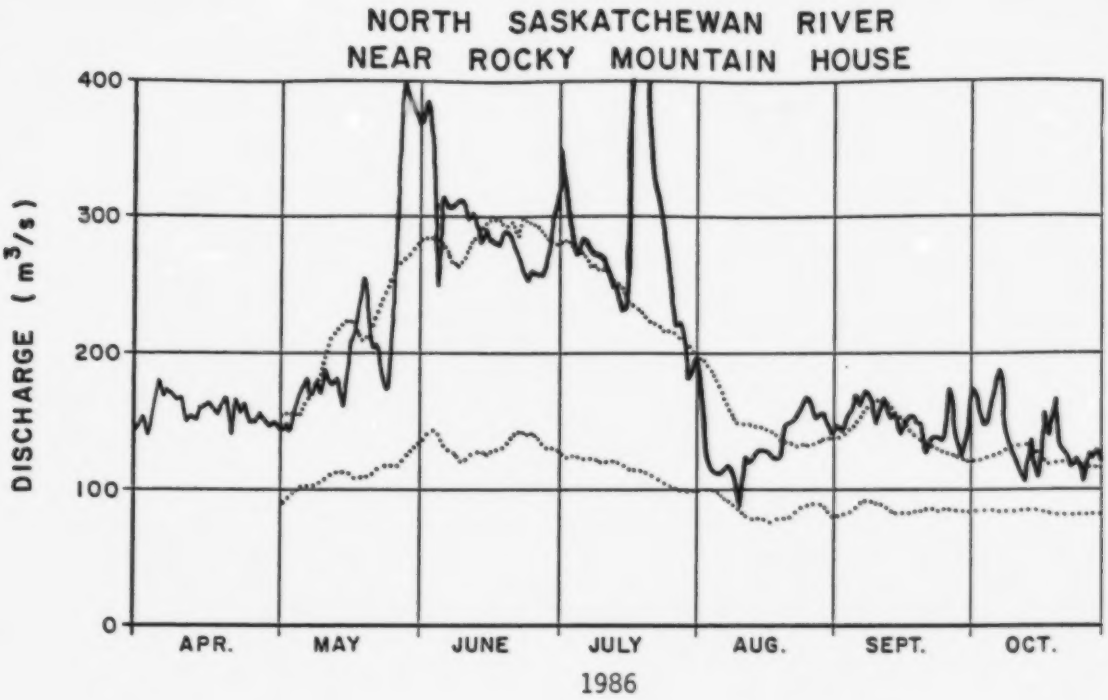
SUMMER PRECIPITATION

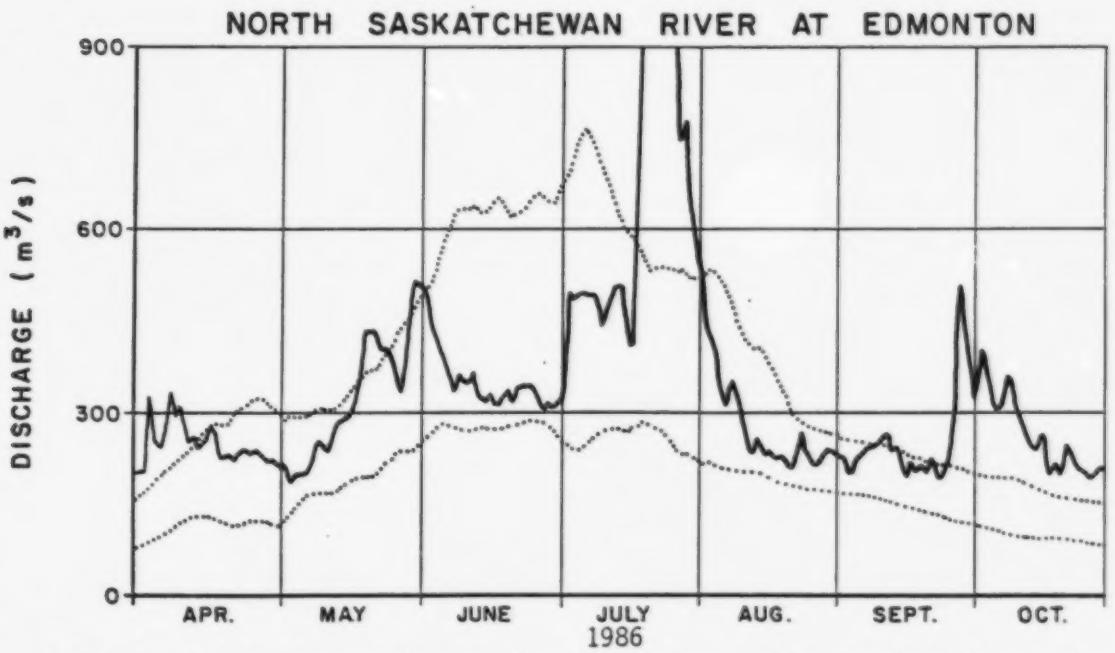
NORTH SASKATCHEWAN RIVER BASIN

FIGURE 38

Alberta ENVIRONMENT

Water Resources





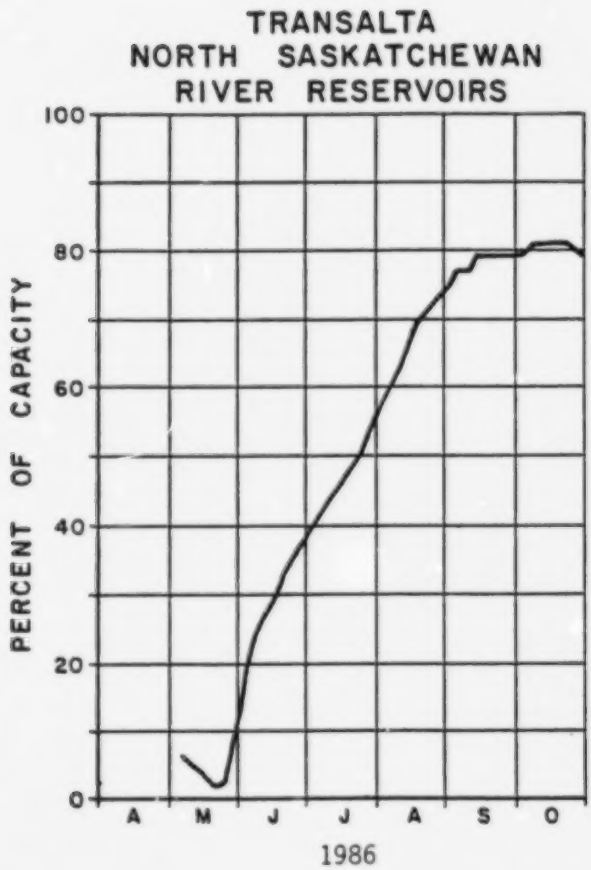
NOTE: Solid line indicates flow for current year; dotted lines show upper and lower quartile values for period of record as an indications of the range of normal behaviour.

WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA

STREAMFLOW HYDROGRAPHS
NORTH SASKATCHEWAN RIVER BASIN

FIGURE 39

Alberta ENVIRONMENT
Water Resources



WATER SUPPLY OUTLOOK FOR SOUTHERN AND CENTRAL ALBERTA	
RESERVOIR STORAGE NORTH SASKATCHEWAN RIVER BASIN	
FIGURE 40	PAGE 63

Alberta ENVIRONMENT

Water Resources

APPENDIX A
SNOW SURVEY DATA

Alberta
ENVIRONMENT

SNOW SURVEY ACTIVITIES

In 1985/86, Alberta Environment operated forty three snow courses in the mountainous areas of the Province and sixty eight in the plains. The following tables contain a summary of all the data collected at these sites in the winter of 1985/86 as well as information on the location of each course.

The main purpose of the snow network is to provide data to the River Forecast Centre to enable it to produce the Water Supply Outlook and make flood forecasts when necessary. For this reason the snow data are included in the Water Supply Outlook reports issued in early March, April, May and June of each year. In addition the data will be published along with snow data from other provinces by the Atmospheric Environment Service in their annual publication, "Snow Cover Data for Canada".

A historical summary containing all data collected in previous years at the snow courses included in this report is available upon request. This summary also includes data from discontinued snow courses. It should be noted that the snow courses are measured at approximately the same date every year. If the measurement cannot be carried out either six days before or six days after the first day of the month, it is not included in the summary.

In addition to the snow courses, data were collected from fourteen snow pillows in 1985/86. Ten of these pillows were equipped to give data on a real-time basis. The primary purpose of snow pillows is to provide an indication of the snow melt rate at higher elevations. On page A-15, a list of all snow pillows operated in 1985/86 is given. Graphs for the pillows which operated satisfactorily are presented on pages A-16 through A-26. The graphs indicate the accumulation and depletion of the water equivalent of the snow pack over the winter. Also shown for comparison purposes are the results of snow surveys carried out by conventional methods at adjacent snow courses.

In 1985/86, four new snow courses were established, the details of which are provided below. Data from the new snow courses located in the North Saskatchewan River basin is collected in cooperation with Trans Alta Utilities.

Name	Number	Approximate Location		Elevation	River Basin
		Latitude	Longtitude	Metres	
Mount Odlum III	14Y21	50°29'	114°25'	2130	Bow
Golden Eagle	16X19	51°49'	116°56'	2090	North Sask.
Watchman Creek	17N03	52°02'	117°14'	1830	North Sask.
Job Lake	16W03	52°49'	116°47'	2100	North Sask.

The following changes in the presentation of the 1985/86 snow course data were made and should be noted. Brown Creek (16W02), Hinton (17V01), and Nordegg (16W01) snow course data has been moved from the plains areas section, and is now located in the mountain section of this report. The North Saskatchewan section of the plains area snow course data has been

split into two sections; one section contains snow course data for the Battle River basin, and the other section contains snow courses located in the North Saskatchewan basin.

In 1985/86, one snow course in the Oldman River basin (Middle Drywood, 14Z05) was discontinued. Four snow courses located in the Cypress Hills which are measured at the end of January and mid-February were added to the list of plains area snow courses. Details on these courses are provided below:

Name	Number	Approximate Location		Elevation	River Basin
		Latitude	Longtitude	Metres	
Gros Ventre (Middle)	10Z04	49°39'	110°22'	1220	Milk
Mitchell Creek (Lower)	10Z06	49°37'	110°19'	1230	Milk
Ross Creek (Lower)	10Z08	49°41'	110°16'	1220	Milk
Thelma Creek	10Z11	49°34'	110°16'	1295	Milk

For further information on snow data, please contact:

G.A. Coles, P. Eng.
Water Survey Section Head
Technical Services Division
11th Floor, Oxbridge Place
9820 - 106 Street
Edmonton, Alberta
T5k 2J6

Telephone: 427 - 6279

ALBERTA SNOW COURSE DATA
MOUNTAIN AREA

STATION NAME	Date of Survey (Mo-Day)	Snow Depth (cm) 1986	Water Equivalent (mm) 1986	1985	Prior to 1986 Max.	Min.	Ave.	Total Years of Record
ST. MARY RIVER BASIN (U.S.A.)**								
Iceberg Lake Trail	04-30	87	356	765	1336	262	779	36
Peigan Pass	04-29	126	480	942	1671	419	1020	36
Mt. Allen	04-29	171	650	1069	1852	544	1192	36
Ptarmigan Lake	04-30	141	569	828	1618	414	982	36
Josephine Lower	04-29	22	76	401	833	112	431	31
OLDMAN RIVER BASIN								
Akamina Pass*	01-28	94	259	414	414	191	324	6
	02-26	119	368	539	539	254	420	7
	03-25	114	368	635	663	307	518	7
	04-28	77	297	511	691	320	457	7
	05-28	0	0	20	378	0	140	5
Allison Pass	01-28	112	309	312	312	193	269	5
	02-27	151	478	373	566	236	386	7
	03-25	147	465	415	823	302	491	23
	04-29	137	484	452	617	333	459	6
Gardiner Headwater*	01-28	167	549	584	584	371	478	3
	02-26	196	663	726	726	465	596	3
	03-25	188	701	782	782	498	640	3
	04-29	208	726	805	805	605	705	3
	05-27	104	434	302	559	302	431	3
Lee Creek "D"	02-26	37	130	196	444	56	179	13
	03-26	0	0	222	615	46	215	17
Lee Creek "E"	02-26	66	211	239	267	91	183	9
	03-26	51	175	279	536	147	261	10
Lee Creek "F"	02-26	30	114	170	231	76	150	11
	03-26	0	0	163	356	53	178	12
Lee Creek "P"	02-26	27	104	137	366	48	157	13
	03-26	0	0	161	358	41	167	14

* Snow pillow data also available at these sites
** Data collected in cooperation with the U.S. Soil Conservation Service

ALBERTA SNOW COURSE DATA
MOUNTAIN AREA

STATION NAME	Date of Survey (Mo-Day)	Snow Depth (cm) 1986	Water Equivalent (mm) 1986	1985	Prior to 1986 Max.	Min.	Ave.	Total Years of Record
OLDMAN RIVER BASIN								
Lee Creek "Q"	02-26	43	142	201	320	97	169	15
	03-26	0	0	198	315	91	178	15
OLDMAN RIVER BASIN								
Racehorse Creek*	01-28	128	376	315	338	188	281	4
	02-27	157	511	389	447	254	363	4
	03-25	162	566	482	482	320	401	3
	04-29	152	559	490	508	330	443	4
	05-27	106	452	66	216	66	125	4
Westcastle Bush	01-28	62	157	320	343	160	265	5
	02-26	80	259	399	429	198	339	6
	03-25	61	216	460	846	226	460	6
	04-29	11	41	264	533	168	325	5
Wilkinson (Bush)	03-25	77	218	239	460	112	219	22
Wilkinson (Open)	03-25	62	178	158	417	94	183	23
BOW RIVER BASIN								
Bow River	01-27	77	165	139	262	79	167	20
	02-27	88	216	163	386	112	202	20
	03-24	93	236	175	437	97	210	50
Bow Summit (NEW)	01-30	116	300	236	292	178	243	7
	02-26	168	404	290	368	277	320	8
	03-26	146	439	315	434	315	359	8
	05-01	146	523	378	439	305	356	8
	05-28	99	394	64	262	0	144	6
Chateau Lawn	01-27	81	183	175	284	122	211	18
	02-27	94	274	203	401	155	256	18
	03-24	107	290	211	480	135	273	45
Cuthead Lake	02-26	174	450	267	312	249	277	5
	03-26	165	521	310	490	302	378	8
	04-30	175	638	338	485	318	387	8
	05-28	135	577	89	404	56	254	8

* Snow pillow data also available at these sites

ALBERTA SNOW COURSE DATA
MOUNTAIN AREA

STATION NAME	Date of Survey (Mo-Day)	Snow Depth (cm) 1986	Water Equivalent (mm) 1986	1985	Prior to 1986 Max.	Min.	Ave.	Total Years of Record
BOW RIVER BASIN								
Highwood Bush	01-28	111	282	262	439	132	274	12
	02-25	156	396	307	439	241	335	14
	03-25	156	478	325	681	259	386	17
	04-29	167	536	460	726	221	461	23
	05-27	149	577	224	455	216	334	6
Katherine Lake	02-26	163	457	274	381	274	327	3
		N/A	N/A	330	521	330	397	6
	05-01	170	625	419	541	284	436	5
	05-28	140	820	297	554	297	420	6
Larch Valley	02-26	176	485	259	399	259	343	5
	03-26	166	508	302	475	302	410	7
	05-01	173	607	381	546	381	459	8
	05-28	141	549	226	478	226	362	7
Little Elbow Summit*	01-28	100	259	221	249	122	183	8
	02-25	138	366	279	279	188	240	8
	03-25	146	404	307	348	234	290	8
	04-29	158	518	406	406	259	343	8
	05-27	135	498	147	373	147	262	6
Lost Creek	01-28	139	434	320	320	193	257	3
	02-27	174	536	386	386	272	329	3
	03-25	176	594	454	454	328	391	3
	04-29	186	658	635	635	417	526	3
	05-27	150	503	351	457	351	404	3
Mirror Lake	01-29	96	244	187	348	109	215	20
	02-27	125	323	183	483	142	254	20
	03-26	129	345	211	561	160	297	47
Mist	03-25	75	211	188	302	140	198	10
	04-29	0	0	104	523	0	186	21
Mount Odlum III	01-28	129	356	307	307	307	307	2
	02-25	156	470	358	358	358	358	2
	03-25	166	546	394	394	394	394	2
	04-29	158	567	480	480	480	480	2
	05-27	115	498	66	66	66	66	2

* Snow pillow data also available at these sites

ALBERTA SNOW COURSE DATA
MOUNTAIN AREA

STATION NAME	Date of Survey (Mo-Day)	Snow Depth (cm) 1986	Water Equivalent (mm) 1986	1985	Prior to 1986 Max.	Min.	Ave.	Total Years of Record
BOW RIVER BASIN								
Mud Lake	01-28	85	201	211	236	160	205	5
	02-25	112	292	292	295	163	251	5
	03-25	126	330	305	424	257	318	9
	04-29	111	361	366	551	206	358	14
		N/A	N/A	0	272	0	99	5
Pipestone, Upper	01-29	85	185	157	279	89	165	20
	02-27	100	244	201	376	107	213	20
	03-26	103	287	196	434	109	210	50
Ptarmigan Hut	02-26	164	394	282	564	213	338	18
	03-26	157	462	338	681	254	410	20
	05-01	155	541	373	658	196	396	20
	05-28	109	447	74	338	0	196	6
Sunshine Village*	01-30	155	451	322	447	317	365	9
	02-28	193	602	399	770	277	486	17
	03-26	209	665	478	996	406	621	20
	04-30	213	739	551	1092	338	643	20
	05-28	178	732	330	627	203	416	8
Tent Ridge	01-28	92	224	226	259	163	216	6
	02-25	118	300	N/A	300	178	257	5
	03-25	133	356	333	389	251	326	5
	04-29	130	404	384	498	254	371	6
		N/A	N/A	53	376	0	165	5
Three Isle Lake*	01-28	160	485	363	376	358	367	5
		N/A	N/A	439	531	439	468	5
	03-25	214	721	513	653	503	554	6
	04-29	223	815	597	737	572	621	6
	05-27	184	775	352	673	345	519	6
RED DEER RIVER BASIN								
Gable Mountain	02-26	89	191	119	135	119	128	5
	03-26	79	185	130	216	130	159	5
	05-01	85	244	163	229	137	182	6
	05-28	38	135	0	130	0	62	6
Limestone Mountain*	01-27	41	99	86	86	62	77	4
	02-25	63	152	114	114	80	97	3
	03-26	68	156	137	137	91	118	4
	04-28	68	183	176	176	94	132	4
	05-29	27	94	0	19	0	10	3

* Snow pillow data also available at these sites

Alberta ENVIRONMENT

ALBERTA SNOW COURSE DATA
MOUNTAIN AREA

STATION NAME	Date of Survey (Mo-Day)	Snow Depth (cm) 1986	Water Equivalent (mm) 1986	1985	Prior to 1986 Max.	Min.	Ave.	Total Years of Record
RED DEER RIVER BASIN								
McConnel Creek	02-26	98	231	150	185	109	143	6
	03-26	88	224	132	216	122	161	6
	05-01	90	269	178	198	76	143	6
	05-28	31	104	0	109	0	32	6
Skoki Mountain*	02-26	153	378	231	287	231	271	5
	03-26	146	424	264	396	264	332	8
	05-01	141	493	333	414	325	354	8
	05-28	101	427	104	358	0	198	8
NORTH SASKATCHEWAN RIVER BASIN								
Brown Creek	02-25	37	80	78	132	36	66	10
	03-24	8	23	59	147	18	68	10
Golden Eagle	02-26	212	574	378	378	378	378	2
	03-25	204	658	437	437	437	437	2
	05-01	209	814	551	551	551	551	2
	05-27	176	747	310	310	310	310	2
Job Lake	02-26	83	180	109	109	109	109	2
	03-25	77	194	132	132	132	132	2
	05-01	84	240	137	137	137	137	2
	05-27	17	69	0	0	0	0	2
Nigel Creek	01-30	115	305	216	528	173	274	16
	02-26	170	404	284	655	185	354	15
	03-25	158	486	333	686	198	413	18
	04-30	160	575	371	752	208	422	17
Watchman Creek	02-26	171	478	378	378	378	378	2
	03-25	173	555	442	442	442	442	2
	05-01	160	597	480	480	480	480	2
	05-27	102	474	0	0	0	0	2
ATHABASCA RIVER BASIN								
Hinton	02-24	38	69	81	122	41	75	12
	03-24	17	39	74	157	0	81	12
Marmot-Jasper	02-27	95	215	187	208	115	173	7
	03-25	92	235	197	422	152	249	17
	04-29	91	283	241	401	0	228	17

*Snow pillow data also available at these sites

ALBERTA SNOW COURSE DATA
MOUNTAIN AREA

STATION NAME	Date of Survey (Mo-Day)	Snow Depth (cm) 1986	Water Equivalent (mm) 1986	1985	Prior to 1986 Max.	Min.	Ave.	Total Years of Record
ATHABASCA RIVER BASIN								
Nordegg	02-25	41	86	84	90	6	53	12
	03-24	34	97	83	109	0	71	12
Sunwapta Falls	01-30	61	122	124	183	84	131	16
	02-27	73	157	154	277	79	164	15
	03-25	67	172	163	333	89	196	18
	04-30	39	113	130	340	0	156	17

ALBERTA SNOW COURSE DATA
PLAINS AREA

STATION NAME	Date of Survey (Mo-Day)	Snow Depth (cm) 1986	Water Equivalent (mm) 1986	1985	Prior to 1985 Max.	Min.	Ave.	Total Years of Record
CYPRESS HILLS								
Gros Ventre Middle	01-22	21	61	66	66	7	44	6
	02-17	36	84	102	114	31	75	6
Gros Ventre Upper	01-22	11	36	81	81	53	66	5
	02-18	29	66	104	104	46	77	6
Mitchell Creek Lower	01-23	26	74	84	84	48	69	5
	02-17	36	99	119	119	69	100	5
Mitchell Creek Upper	01-22	27	91	94	94	69	79	5
	02-18	36	86	114	114	81	95	5
Ross Creek Lower	01-23	27	71	104	104	38	63	6
	02-17	42	107	102	107	56	84	6
Ross Creek Upper	01-22	35	102	N/A	84	66	77	4
	02-18	47	109	97	122	81	100	4
Thelma Creek	01-22	0	0	0	0	0	0	4
	02-17	4	10	119	119	0	60	4
RED DEER RIVER BASIN								
Bentley	02-26	6	11	62	79	7	45	13
	03-20	0	0	61	79	0	43	10
	04-04	0	0	49	150	0	46	12
Dickson	02-25	8	28	50	97	34	57	13
	03-18	0	0	45	124	0	55	10
	04-09	0	0	22	112	0	49	12
Hoadley	02-26	0	0	67	74	6	46	12
	03-20	0	0	64	102	0	52	12
	04-04	0	0	30	163	0	49	12
Innisfail, East	02-25	0	0	48	53	0	29	11
	03-18	0	0	51	89	0	31	10
	04-03	0	0	14	122	0	24	11
James River	02-26	30	63	93	107	31	63	12
	03-19	30	75	102	122	41	77	11
	04-03	11	26	99	122	43	82	12

ALBERTA SNOW COURSE DATA
PLAINS AREA

STATION NAME	Date of Survey (Mo-Day)	Snow Depth (cm) 1986	Water Equivalent (mm) 1986	1985	Prior to 1986 Max.	Min.	Ave.	Total Years of Record
RED DEER RIVER BASIN								
Kneenill Valley	02-25	7	23	47	99	15	51	12
	03-18	0	0	53	112	0	54	12
	04-02	0	0	29	86	0	35	11
Sundre	02-26	17	37	41	84	6	44	12
	03-19	0	0	47	107	0	52	11
	04-03	0	0	0	119	0	39	12
BATTLE RIVER BASIN								
Coronation	02-25	13	34	79	99	13	44	13
	03-18	0	0	68	102	0	36	11
	04-02	0	0	53	165	0	34	12
Gadsby	02-25	8	19	43	99	0	39	14
	03-18	0	0	35	64	0	25	13
	04-02	0	0	0	135	0	18	14
Lougheed	02-25	26	47	69	74	30	52	12
	03-18	3	10	75	79	0	50	12
	04-02	0	0	52	119	0	49	11
Mannville	02-28	21	58	60	104	30	55	12
	03-18	16	52	60	81	0	49	12
	04-02	0	0	6	109	0	39	11
Pipestone Creek	02-24	23	47	46	79	30	55	7
	03-20	5	18	48	102	18	58	11
	04-04	0	0	46	137	0	52	11
				14	124	0	36	9
Wainwrignt	02-27	19	53	65	65	28	43	11
	03-18	4	14	61	61	0	40	12
	04-02	0	0	26	150	0	34	12
Wetaskiwin	02-27	4	11	52	69	0	41	13
	03-20	0	0	52	97	0	41	11
	04-04	0	0	25	99	0	24	11
NORTH SASKATCHEWAN RIVER BASIN								
Bellis	02-26	40	85	107	122	39	73	13
	03-20	39	92	100	112	56	81	12
	04-02	23	74	100	152	29	83	10

ALBERTA SNOW COURSE DATA
PLAINS AREA

STATION NAME	Date of Survey (Mo-Day)	Snow Depth (cm) 1986	Water Equivalent (mm) 1986	1985	Prior to 1986 Max.	Min.	Ave.	Total Years of Record
NORTH SASKATCHEWAN RIVER BASIN								
Brazeau Reservoir	02-25	23	54	93	94	51	75	10
	03-19	5	19	89	127	41	78	10
	04-02	1	1	69	126	0	59	10
Bruce Snow Pillow*	02-01	35E	56E	52	58	25	44	7
	02-27	33	75	66	74	30	55	11
	03-17	31	88	65	66	97	68	12
	04-01	16	47	64	94	10	66	11
Clandonald	02-27	30	68	81	122	13	59	13
	03-19	28	80	79	81	20	57	12
	04-04	04	13	22	168	0	53	12
Crimson Lake	02-26	20	56	66	99	8	64	13
	03-20	11	35	68	114	0	72	11
	04-04	0	0	52	122	0	68	12
Elk Island Park	02-28	32	71	119	152	28	75	13
	03-21	27	99	114	114	27	74	12
	04-04	10	34	84	180	0	80	10
Leduc	02-27	13	30	59	130	41	73	13
	03-20	0	0	57	130	34	67	12
	04-04	0	0	9	168	0	56	12
Morinville	02-27	9	28	85	130	17	55	13
	03-13	6	15	65	94	20	51	12
	04-02	0	0	13	170	0	48	11
Onoway	02-25	17	33	115	115	15	60	13
	03-19	3	10	112	112	8	54	12
	04-02	0	0	63	196	0	44	11
Saint Paul	02-27	19	48	70	99	13	50	13
	03-19	12	37	72	99	14	49	12
	04-04	0	0	27	117	0	43	12
Two Hills	02-28	18	48	78	124	28	59	13
	03-19	9	28	74	76	29	53	12
	04-04	0	0	36	152	0	54	11
Waskatenau	02-26	24	60	77	117	30	61	13
	03-20	18	59	86	86	23	61	12
	04-02	1	2	64	147	0	62	11

*Snow pillow data also available for this site.

ALBERTA SNOW COURSE DATA
PLAINS AREA

STATION NAME	Date of Survey (Mo-Day)	Snow Depth (cm) 1986	Water Equivalent (mm) 1986	1985	Prior to 1986 Max.	Min.	Ave.	Total Years of Record
CHURCHILL RIVER BASIN								
Bonnyville, North	02-26	35	69	66	119	35	60	12
	03-19	35	80	82	102	25	60	12
	04-04	6	20	55	155	0	61	12
ATHABASCA RIVER BASIN								
Barrhead, North	02-26	13	29	86	145	18	63	13
	03-17	6	19	80	109	33	59	12
	04-03	0	0	19	147	0	51	12
Barrhead, West	02-27	13	23	103	99	13	59	13
	03-17	8	23	89	84	28	55	12
	03-30	0	0	31	145	0	46	12
Edson	02-24	29	46	135	155	36	82	12
	03-19	15	54	127	165	25	84	13
	04-02	9	32	115	168	0	67	12
Embarras Portage	01-30	51	71	46	76	46	56	8
	02-26	52	89	69	102	41	69	12
	03-18	43	81	64	112	48	76	13
	04-04	32	81	76	99	38	64	10
Flatbush	02-26	32	54	131	131	28	73	13
	03-13	24	60	127	127	43	75	12
	04-02	9	22	104	175	0	70	11
Fort Chipewyan Airport*	02-03	44	51	56	86	28	50	13
	02-26	43	53	71	122	28	65	12
	03-17	41	61	74	152	28	77	14
	04-04	32	89	74	127	41	83	13
Grassland	02-26	21	46	88	102	8	53	13
	03-20	3	8	79	107	10	50	12
	04-02	0	0	39	130	0	51	12
High Prairie	03-05	12	13	94	132	0	67	13
	03-19	10	27	56	0	112	60	12
	04-03	0	0	46	185	0	71	11

* Snow pillow data also available for this site.

ALBERTA SNOW COURSE DATA
PLAINS AREA

STATION NAME	Date of Survey (Mo-Day)	Snow Depth (cm) 1986	Water Equivalent (mm) 1986	1985	Prior to 1986 Max.	Prior to 1986 Min.	Ave.	Total Years of Record
ATHABASCA RIVER BASIN								
Highrock Tower	01-29	47	48	61	114	25	53	12
	03-03	44	66	69	122	30	69	12
	03-17	45	64	75	130	33	76	12
	04-01	37	76	107	142	38	83	11
Jackfish Village	01-31	45	69	43	76	38	50	10
	02-27	44	53	53	94	43	67	10
	03-13	44	64	69	102	33	70	12
	04-03	37	84	66	104	23	76	12
Kinuso	02-26	32	57	155	155	23	80	13
	03-14	46	107	161	161	38	82	12
	04-02	30	107	137	163	0	74	11
Lodgepole	02-25	23	49	137	137	42	87	13
	03-19	12	42	134	157	28	83	21
	04-02	5	18	123	165	0	80	14
Mayerthorpe*	01-29	19	38	80	114	23	65	5
	02-25	20	38	108	114	36	78	5
	03-18	20	58	100	152	51	94	5
	04-02	3	8	95	150	18	81	5
Meadowview	02-27	17	36	113	137	30	77	13
	03-17	8	22	109	132	41	73	22
	04-03	0	0	64	160	0	70	13
Obed	02-24	25	48	92	165	0	73	12
	03-19	9	28	85	178	0	86	13
	04-02	1	4	58	196	0	76	12
Perryvale, East	02-26	30	59	116	137	32	68	13
	03-20	30	89	118	118	37	68	12
	04-02	18	52	105	150	0	65	11
Saulteaux River	02-26	36	69	96	112	38	73	13
	03-13	30	72	94	109	48	73	12
	04-02	14	33	97	198	5	75	11

* Snow pillow data also available for this site.

ALBERTA SNOW COURSE DATA
PLAINS AREA

STATION NAME	Date of Survey (Mo-Day)	Snow Depth (cm) 1986	Water Equivalent (mm) 1986	1985	Prior to 1986 Max.	Min.	Ave.	Total Years of Record
ATHABASCA RIVER BASIN								
Twin Lakes*	01-30	8	1	81	84	18	54	5
	02-27	19	33	94	94	28	66	5
	03-15	16	43	83	109	31	69	5
	04-03	3	8	67	119	11	60	5
Westlock	02-27	7	18	91	130	13	59	15
	03-17	5	17	66	112	0	56	22
	04-02	0	0	27	160	0	43	12
Whitecourt	02-25	19	41	106	157	28	83	13
	03-14	23	53	108	127	32	82	12
	04-02	11	35	112	157	0	71	11
PEACE RIVER BASIN								
Bezanson	03-03	0	0	0	145	0	62	12
	03-14	6	13	0	144	0	67	13
	03-31	0	0	0	193	0	58	11
Eureka River	03-03	36	65	70	127	51	75	13
	03-17	36	84	88	122	48	83	12
	04-01	20	50	89	155	0	73	10
Fairview	03-03	22	58	69	130	22	70	13
	03-17	23	56	61	117	16	78	13
	04-01	10	29	71	112	0	61	10
Girouxville	03-05	6	22	77	130	22	64	13
	03-18	16	36	34	127	0	55	12
	04-02	0	0	23	124	0	47	11
Hythe	03-04	0	0	N/A	142	0	64	13
	03-14	9	19	0	151	0	54	12
	03-31	0	0	0	173	0	50	11
Little Smoky River	03-05	18	33	110	141	47	87	11
	03-19	18	51	98	146	0	85	13
	04-03	0	0	83	164	0	74	10
North Star-Manning	03-04	0	0	20	86	0	38	12
	03-17	9	11	N/A	99	0	41	12
	04-01	0	0	N/A	107	0	45	10

* Snow pillow data also available for this site.

ALBERTA SNOW COURSE DATA
PLAINS AREA

STATION NAME	Date of Survey (Mo-Day)	Snow Depth (cm) 1986	Water Equivalent (mm) 1986	1985	Prior to 1986 Max.	Min.	Ave.	Total Years of Record
PEACE RIVER BASIN								
Rycroft	03-03	0	0	37	127	0	51	13
	03-17	5	15	27	126	0	44	12
	04-01	0	0	0	155	0	50	10
Sexsmith	03-04	11	29	85	190	33	88	13
	03-14	11	35	107	160	27	90	12
	03-31	0	0	61	218	0	91	10
Spring Creek #1*	01-27	30	60	94	137	27	84	20
	03-03	30	75	123	180	56	113	20
	03-17	35	100	128	213	34	118	19
	04-01	19	53	95	216	0	104	19
Spring Creek #2*	02-27	22	42	91	130	24	78	20
	03-03	19	41	114	166	50	104	20
	03-17	21	57	103	198	27	103	19
	04-01	0	0	51	208	0	87	19
Spring Creek #3	01-27	27	52	86	145	41	84	20
	03-03	24	64	132	180	48	110	19
	03-17	25	69	118	206	33	115	19
	04-01	0	0	80	216	0	101	19
Spring Creek #4	01-27	29	60	84	140	42	85	19
	03-03	30	71	122	189	51	113	19
	03-17	35	99	123	191	43	114	18
	04-01	0	0	97	224	13	108	18
Sweetgrass	02-04	47	51	46	46	25	39	8
	02-28	47	51	69	140	36	65	10
	03-14	48	61	86	137	0	60	9
	04-01	36	74	79	137	28	68	10

* Snow pillow data also available for this site.

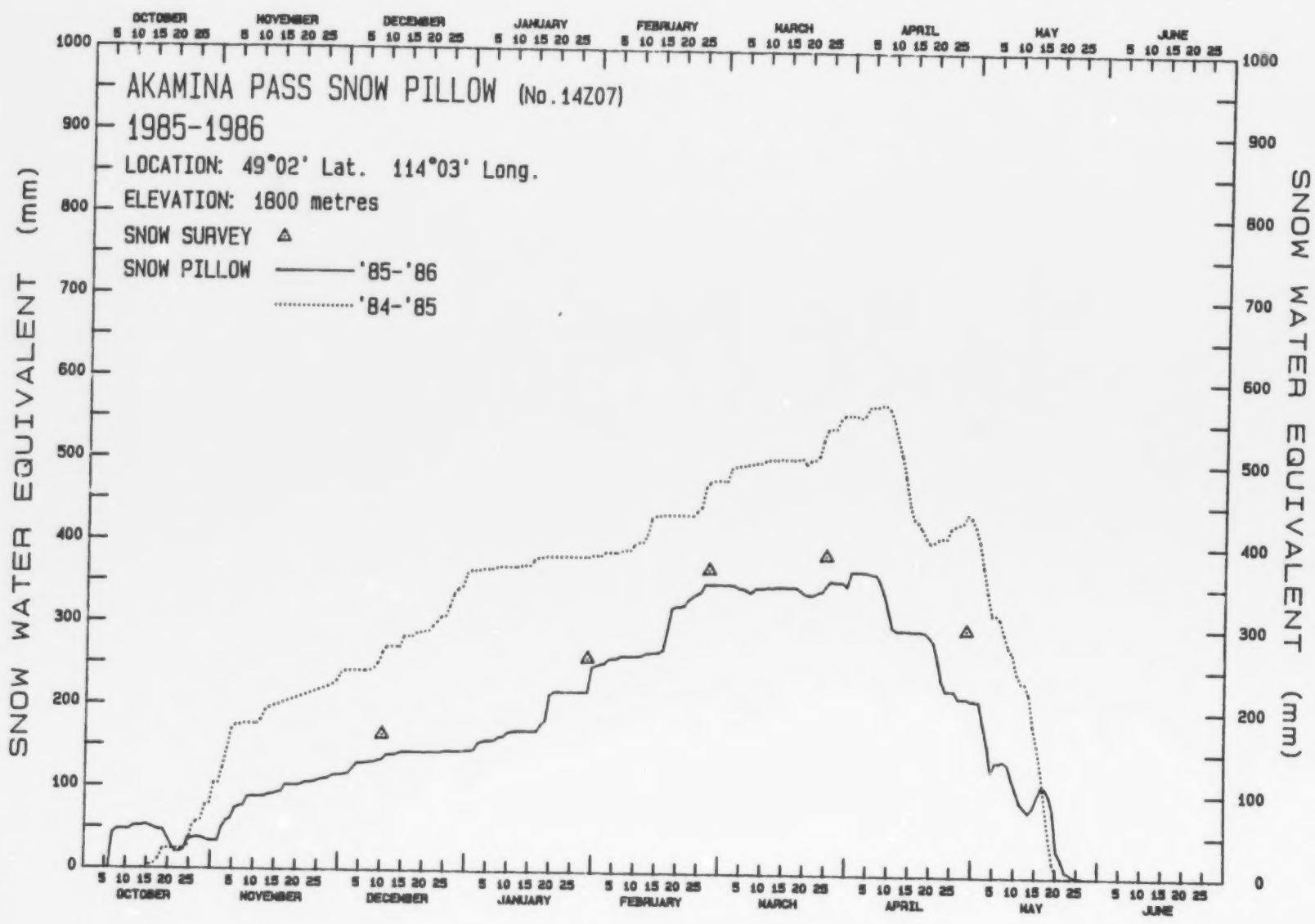
LIST OF SNOW PILLOWS

1985 / 1986

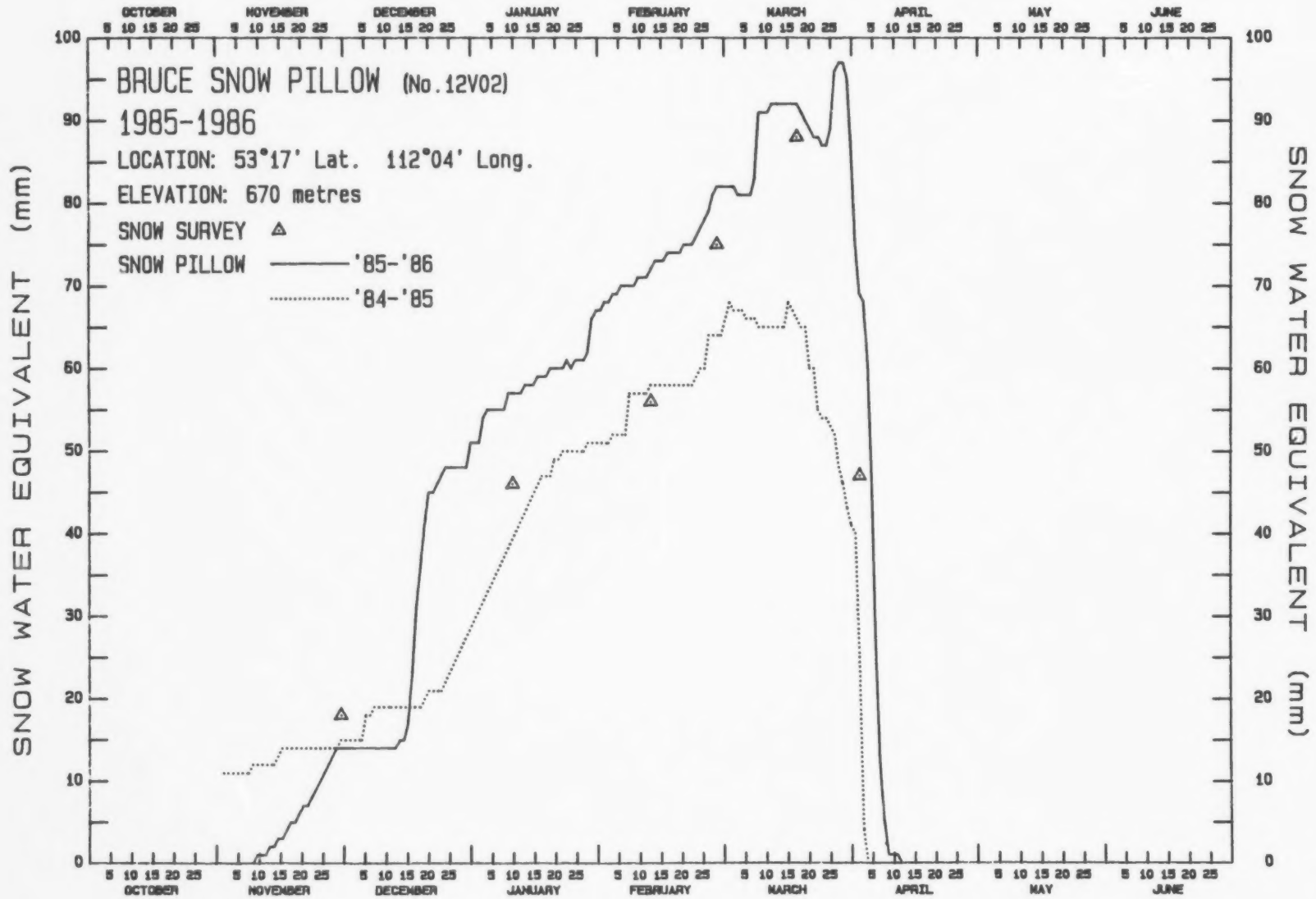
NAME	SNOW COURSE NUMBER	RIVER BASIN	ELEVATION (METRES)
Akamina	14Z07	Oldman	1800
Bruce	12V02	N. Saskatchewan	670
Fort Chipewyan Airport	11Q02	Athabasca	210
Gardiner Headwaters*	14Z10	Oldman	1970
Little Elbow Summit	14Y18	Bow	2160
Limestone Ridge	15X06	N. Saskatchewan	1950
Mayerthorpe*	15V07	Athabasca	760
Mount Skoki	16X15	Bow	2055
Racehorse Creek	14Z08	Oldman	1920
Spring Creek #1	17V02	Peace	720
Spring Creek #2	17V03	Peace	655
Sunshine Village	15X03	Bow	2225
Three Isle Lake	15Y25	Bow	2160
Twin Lakes	14V10	Athabasca	655

* Because of a malfunction at the Gardiner and Mayerthorpe snow pillows, no plots are available.

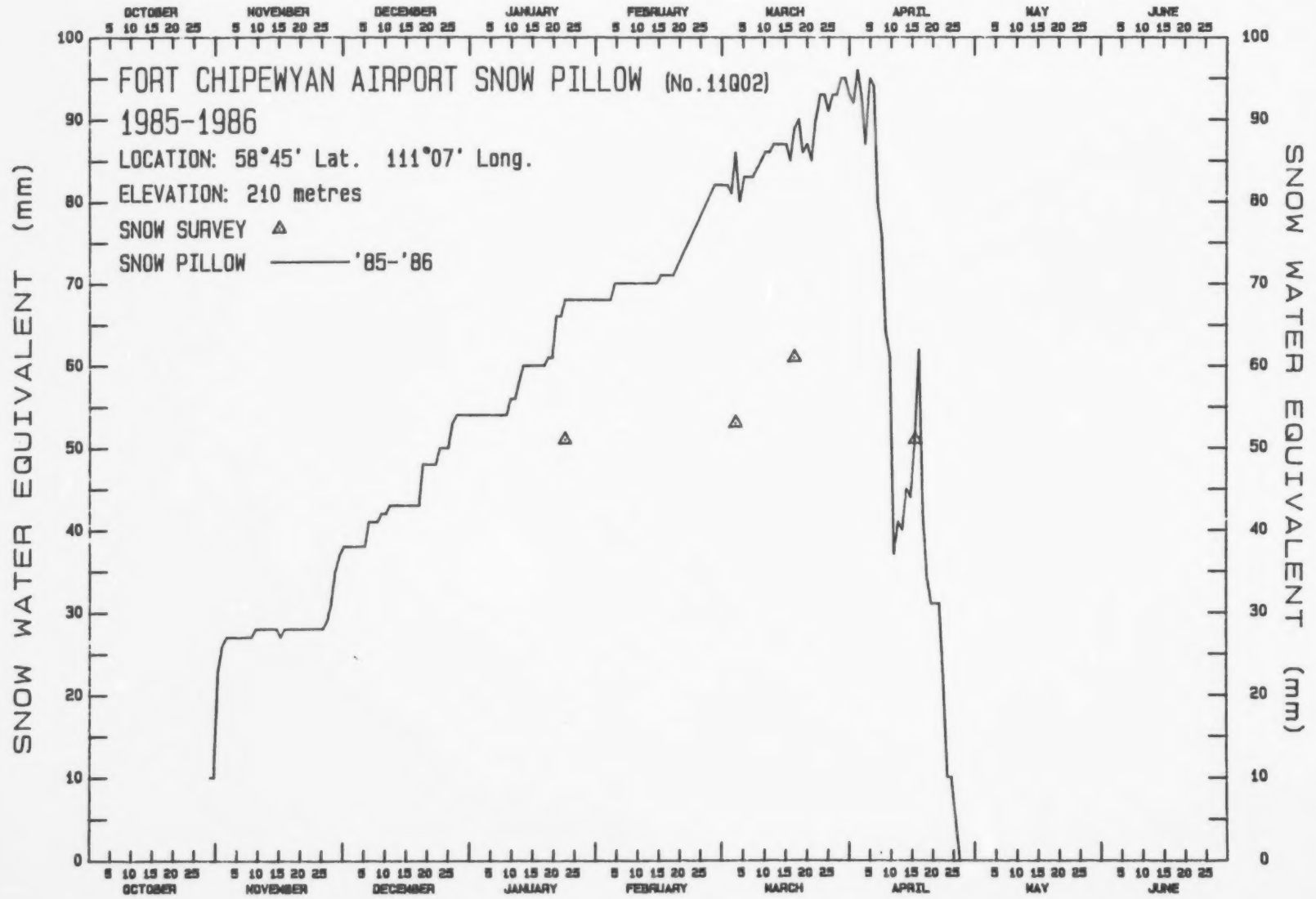
Alberta ENVIRONMENT


AKAMINA PASS SNOW PILLOW (No.14Z07)
1985-1986
LOCATION: 49°02' Lat. 114°03' Long.
ELEVATION: 1800 metres
SNOW SURVEY △
SNOW PILLOW '85-'86
'84-'85
SNOW WATER EQUIVALENT (mm)
SNOW WATER EQUIVALENT (mm)
OCTOBER NOVEMBER DECEMBER JANUARY FEBRUARY MARCH APRIL MAY JUNE
0 100 200 300 400 500 600 700 800 900 1000

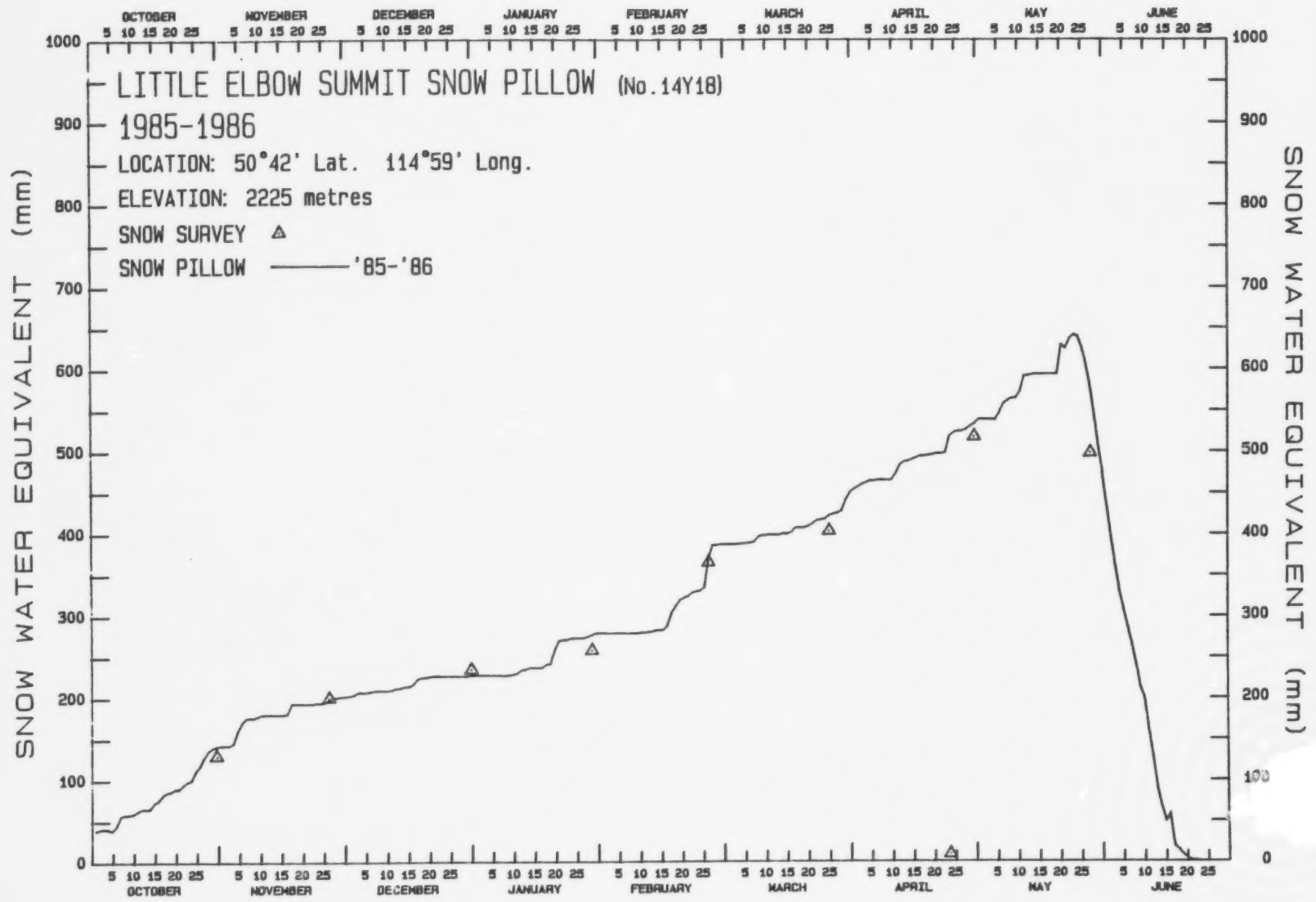
Alberta ENVIRONMENT


BRUCE SNOW PILLOW (No.12V02)
1985-1986
LOCATION: 53°17' Lat. 112°04' Long.
ELEVATION: 670 metres
SNOW SURVEY
SNOW PILLOW '85-'86
'84-'85
SNOW WATER EQUIVALENT (mm)
SNOW WATER EQUIVALENT (mm)
OCTOBER NOVEMBER DECEMBER JANUARY FEBRUARY MARCH APRIL MAY JUNE
0 10 20 30 40 50 60 70 80 90 100

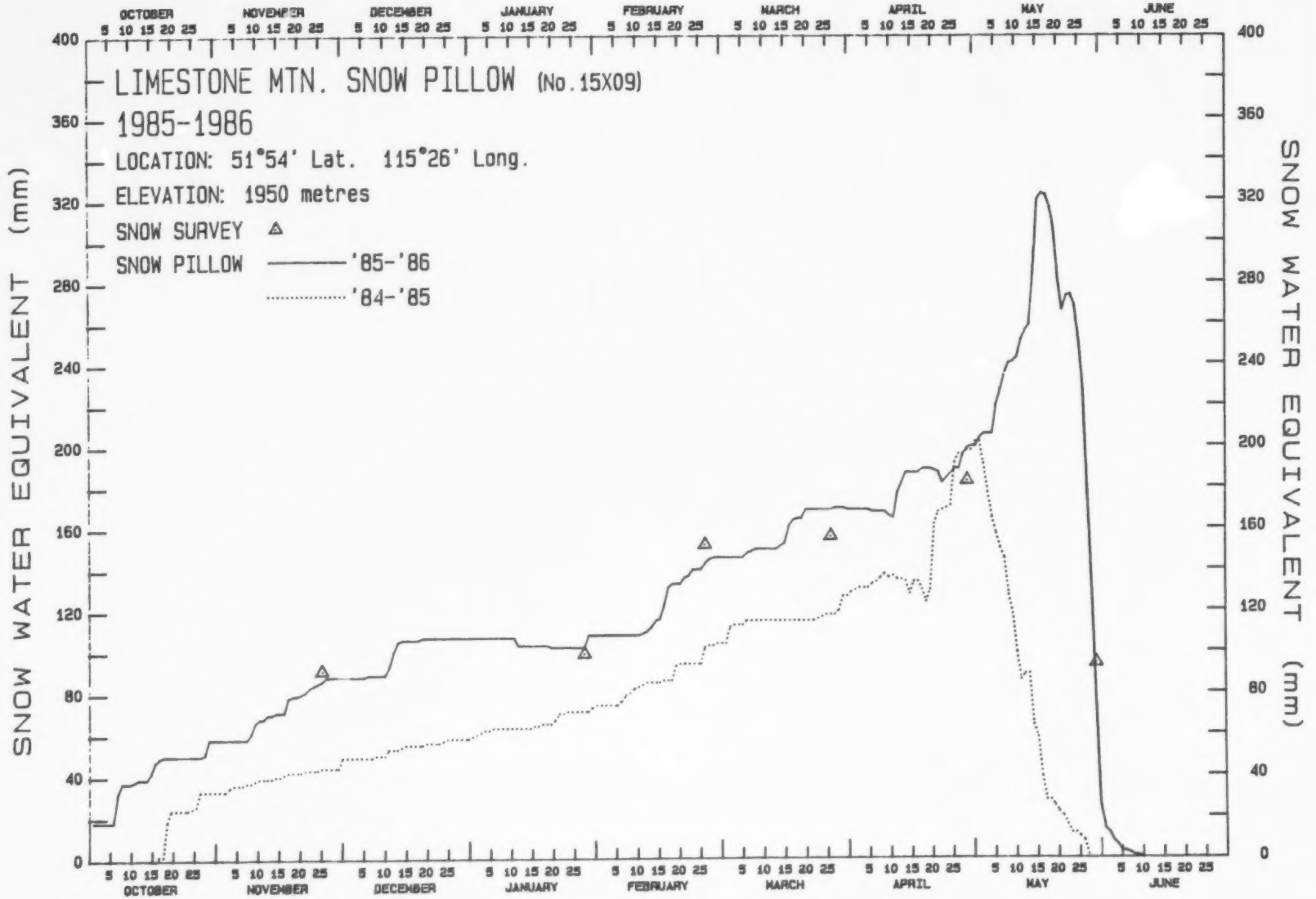
Alberta ENVIRONMENT



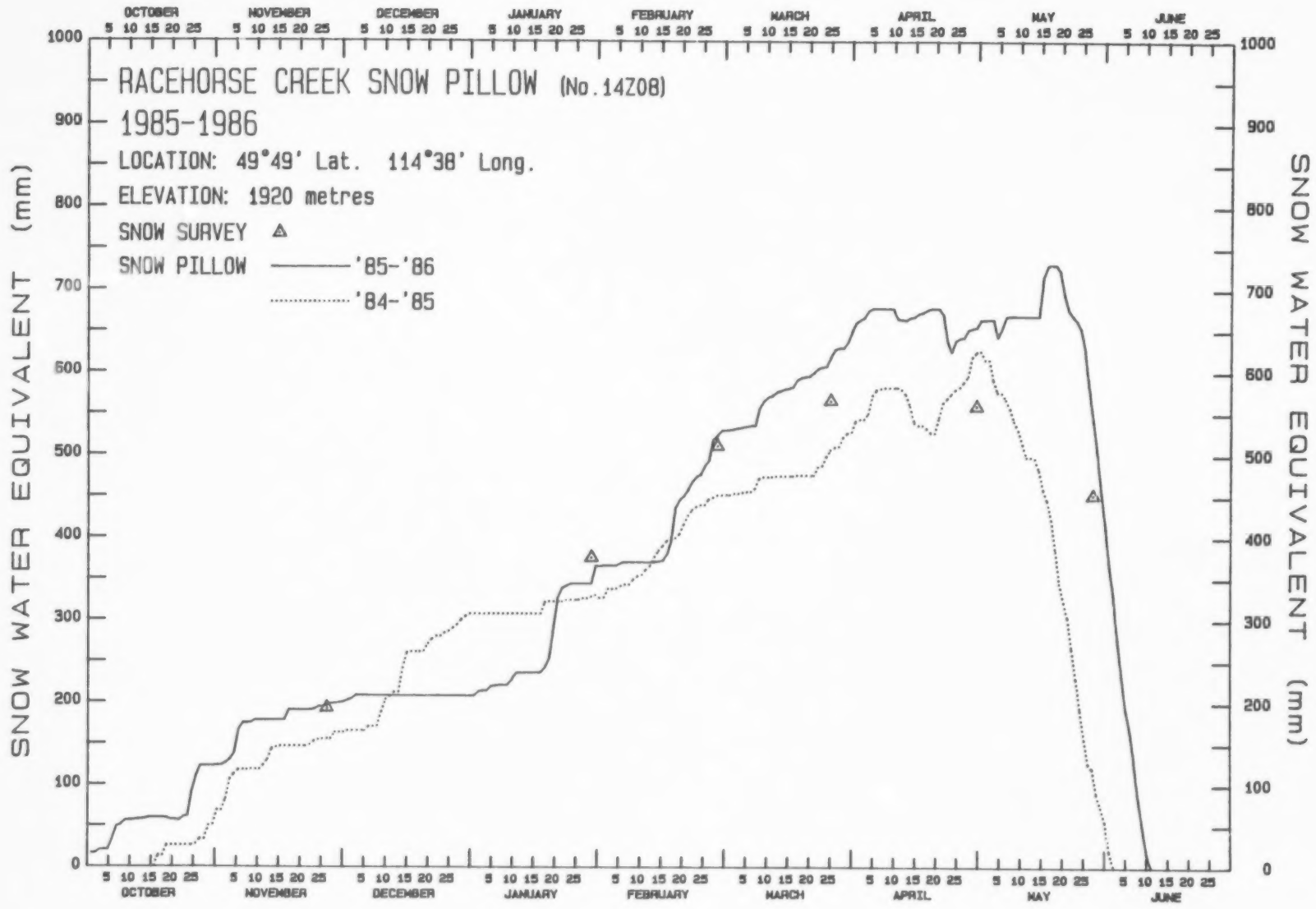
Alberta
ENVIRONMENT



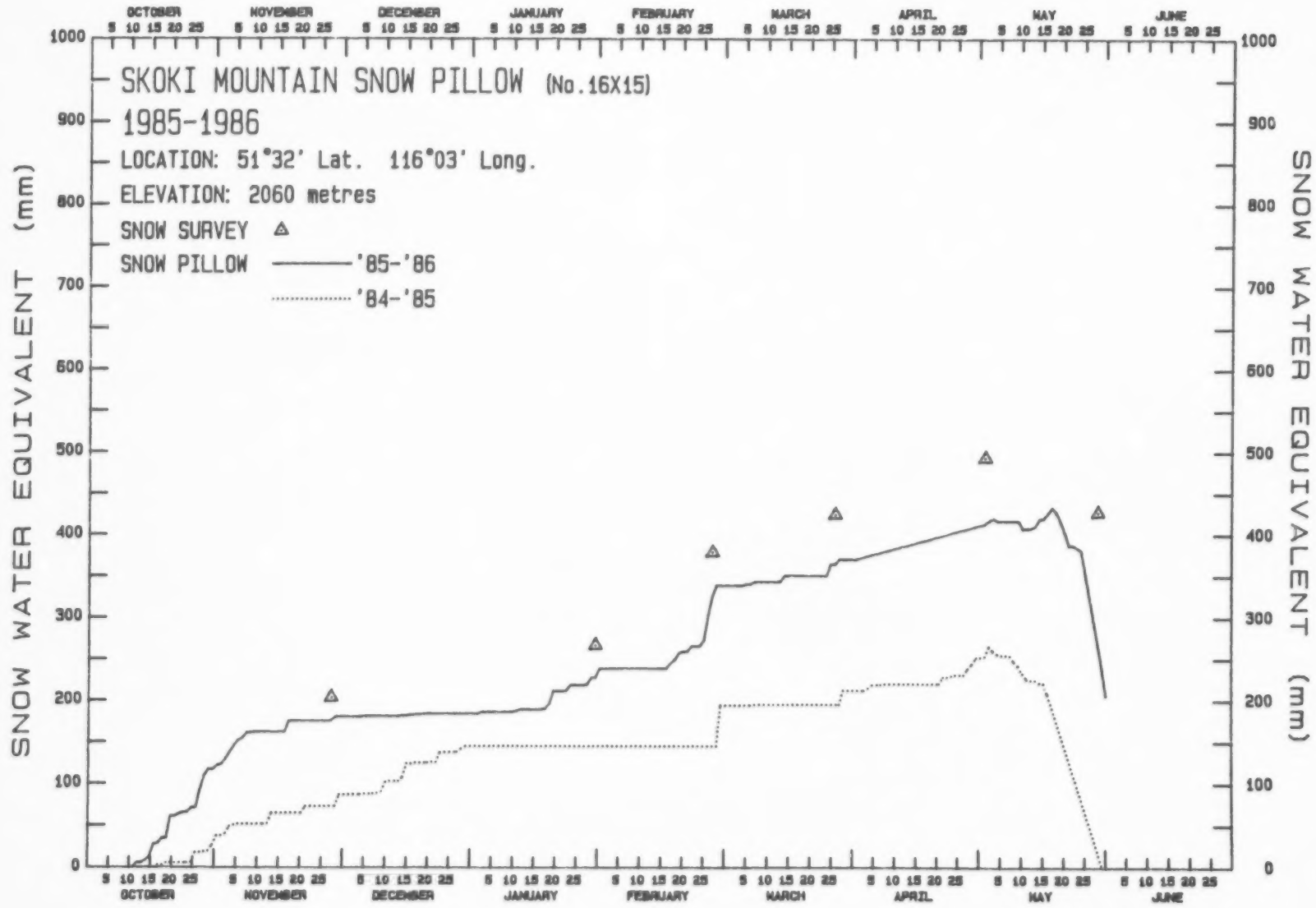
Alberta ENVIRONMENT



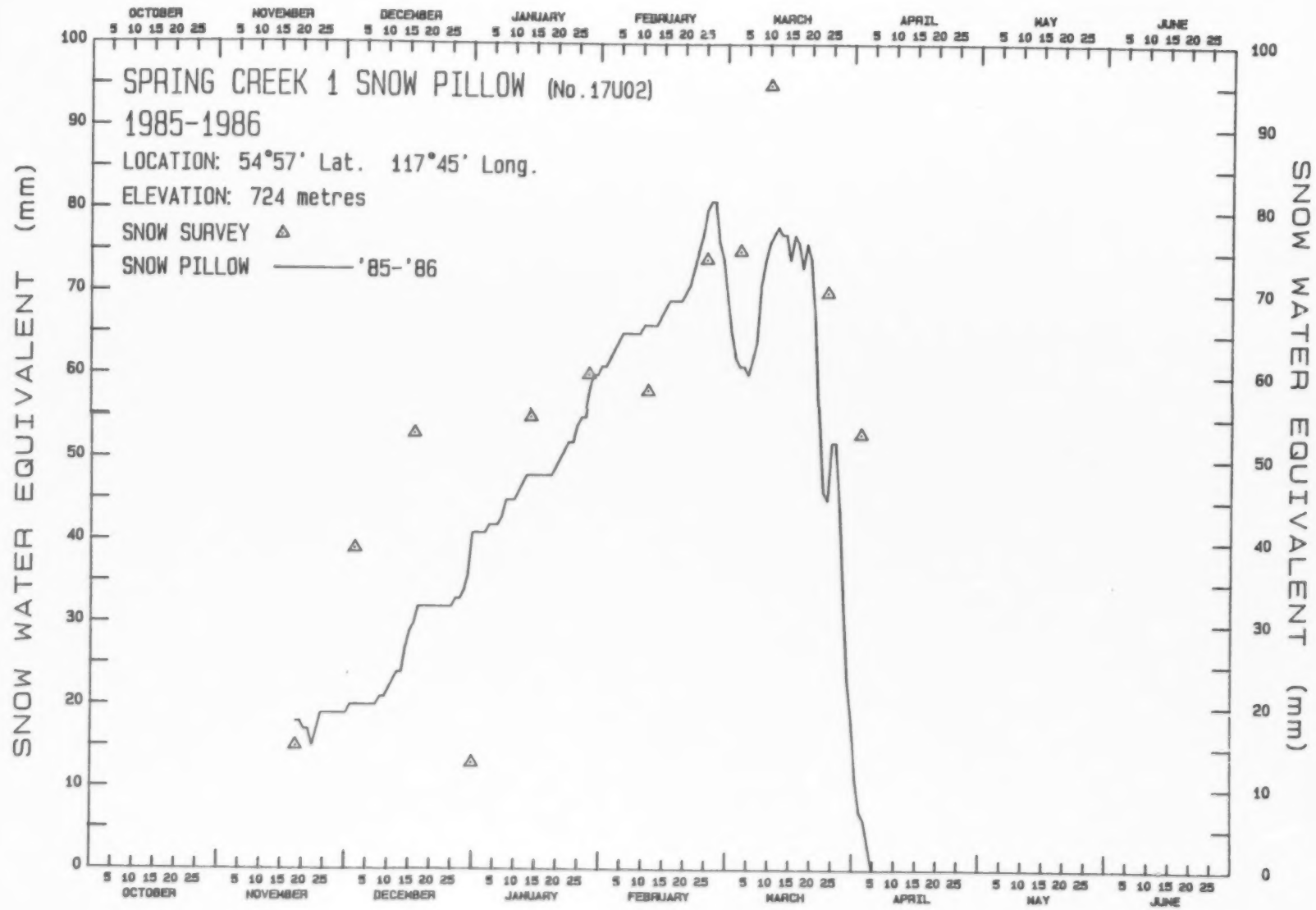
Alberta
ENVIRONMENT



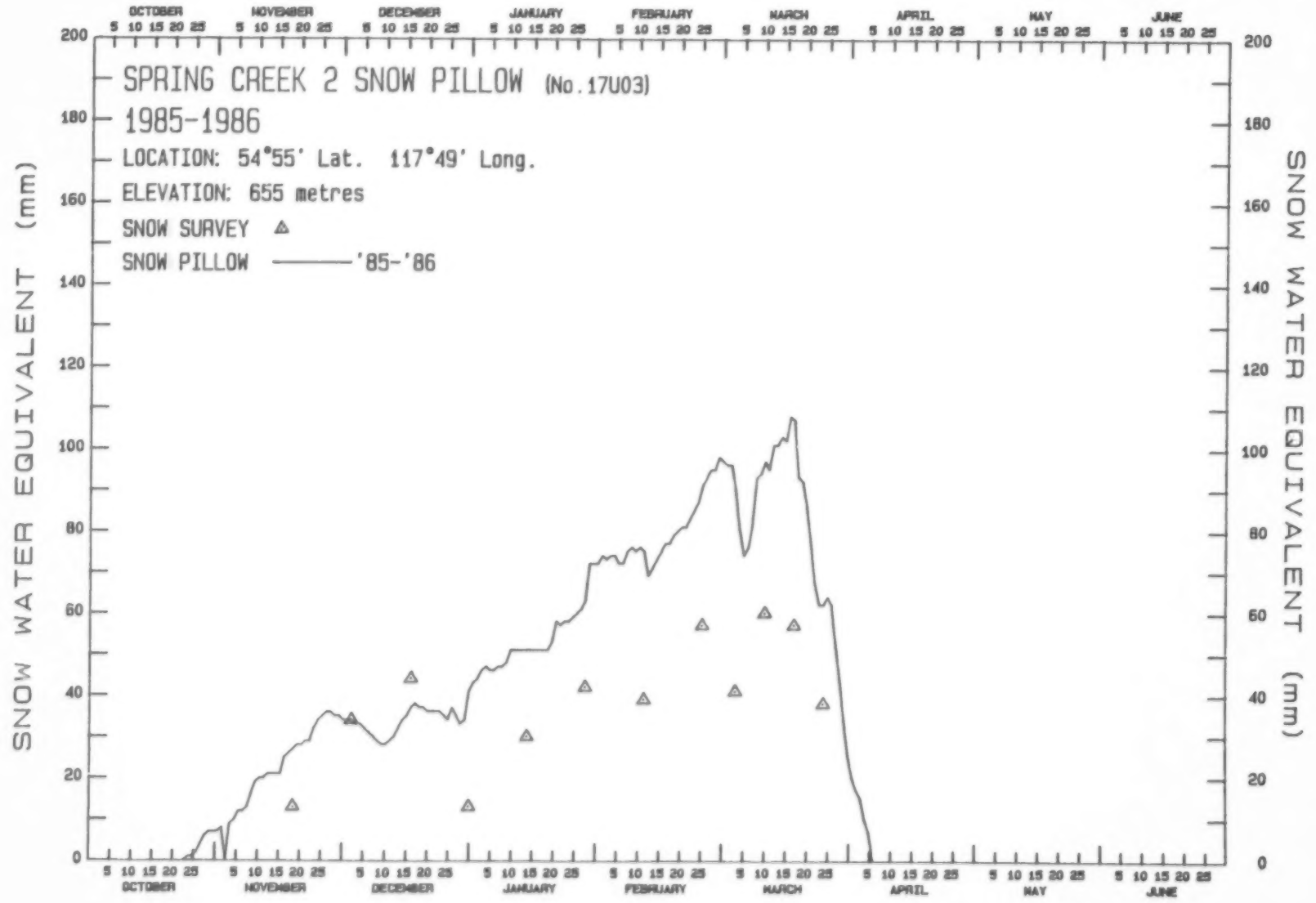
Alberta
ENVIRONMENT



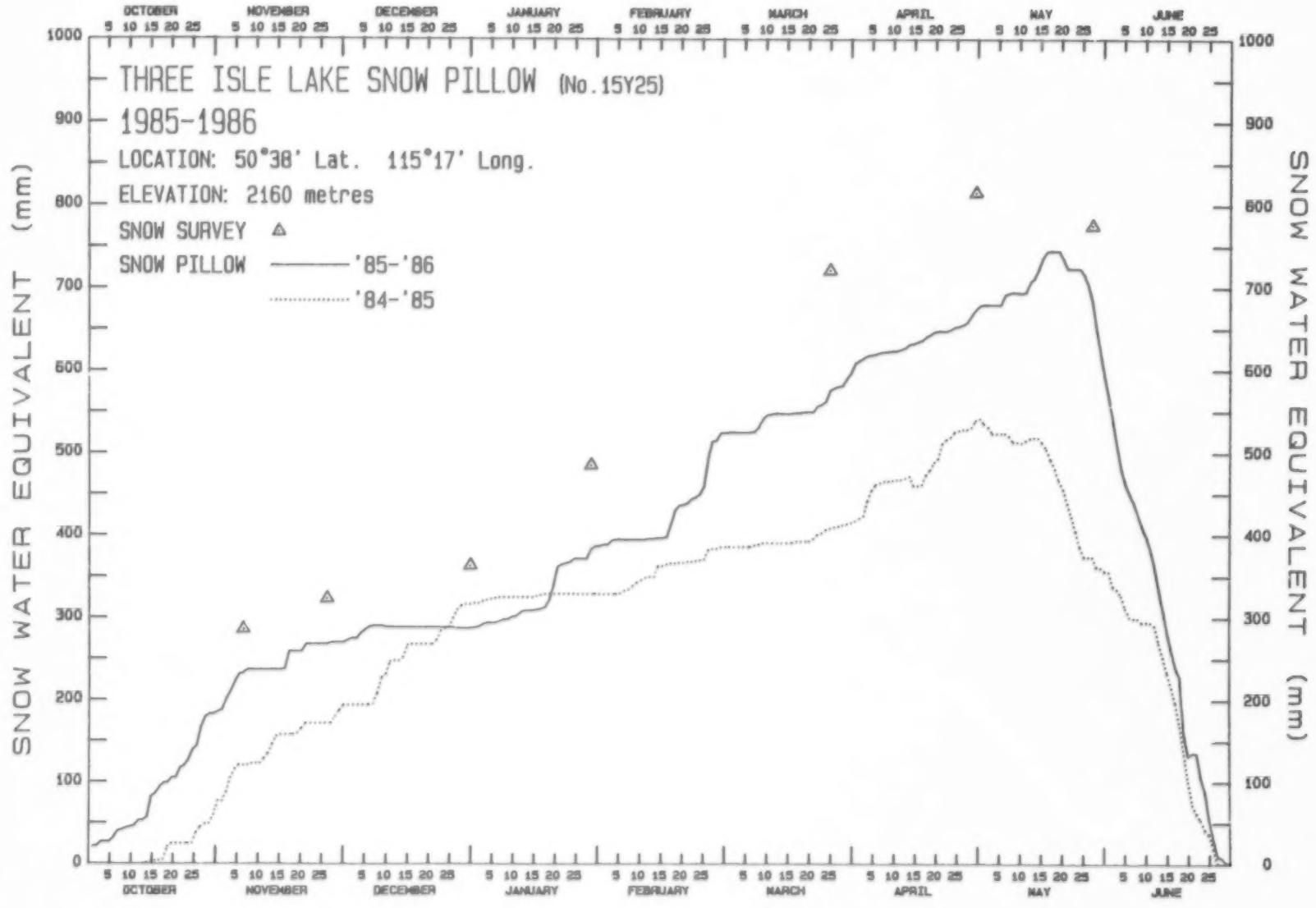
Alberta ENVIRONMENT



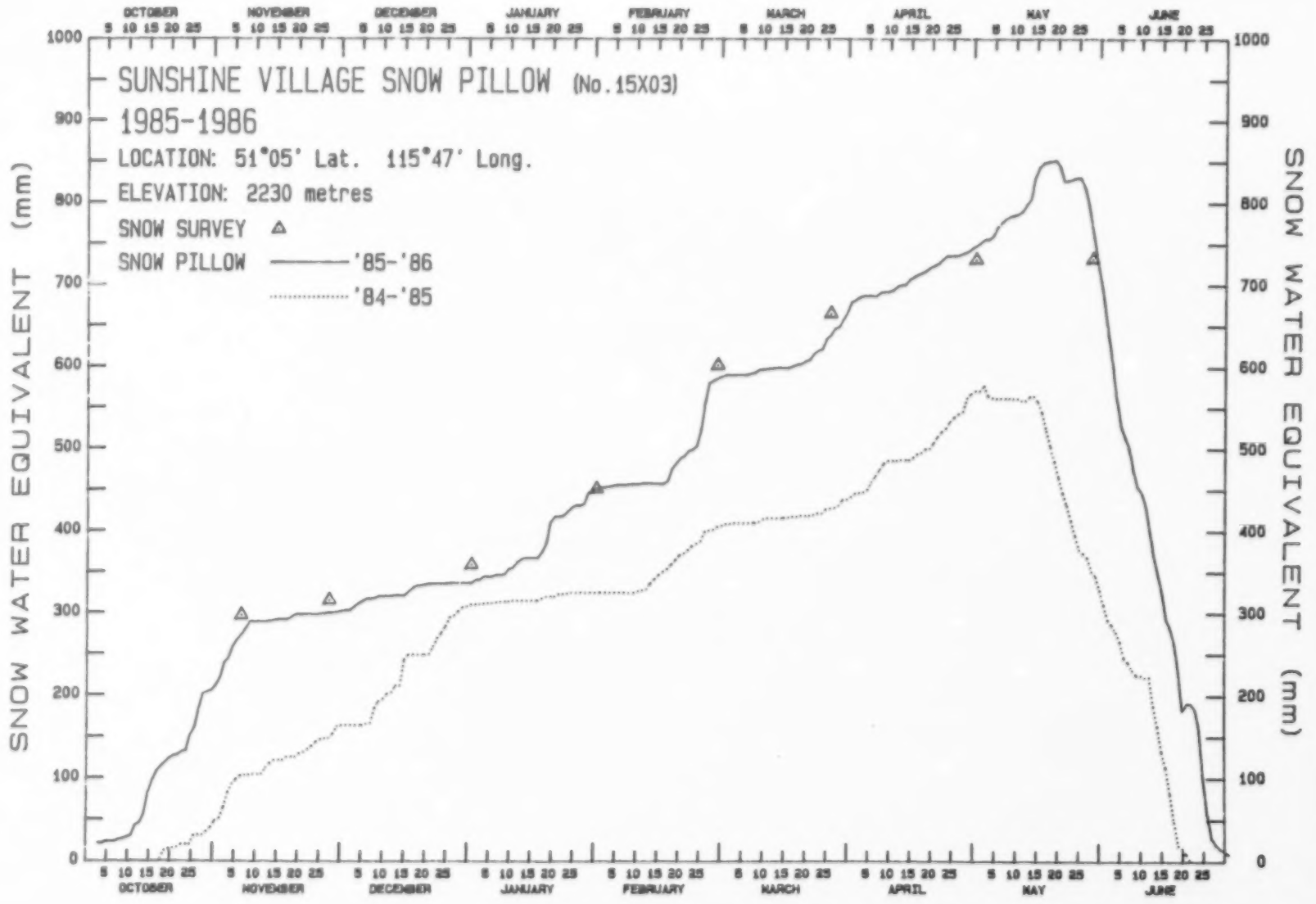
Alberta ENVIRONMENT

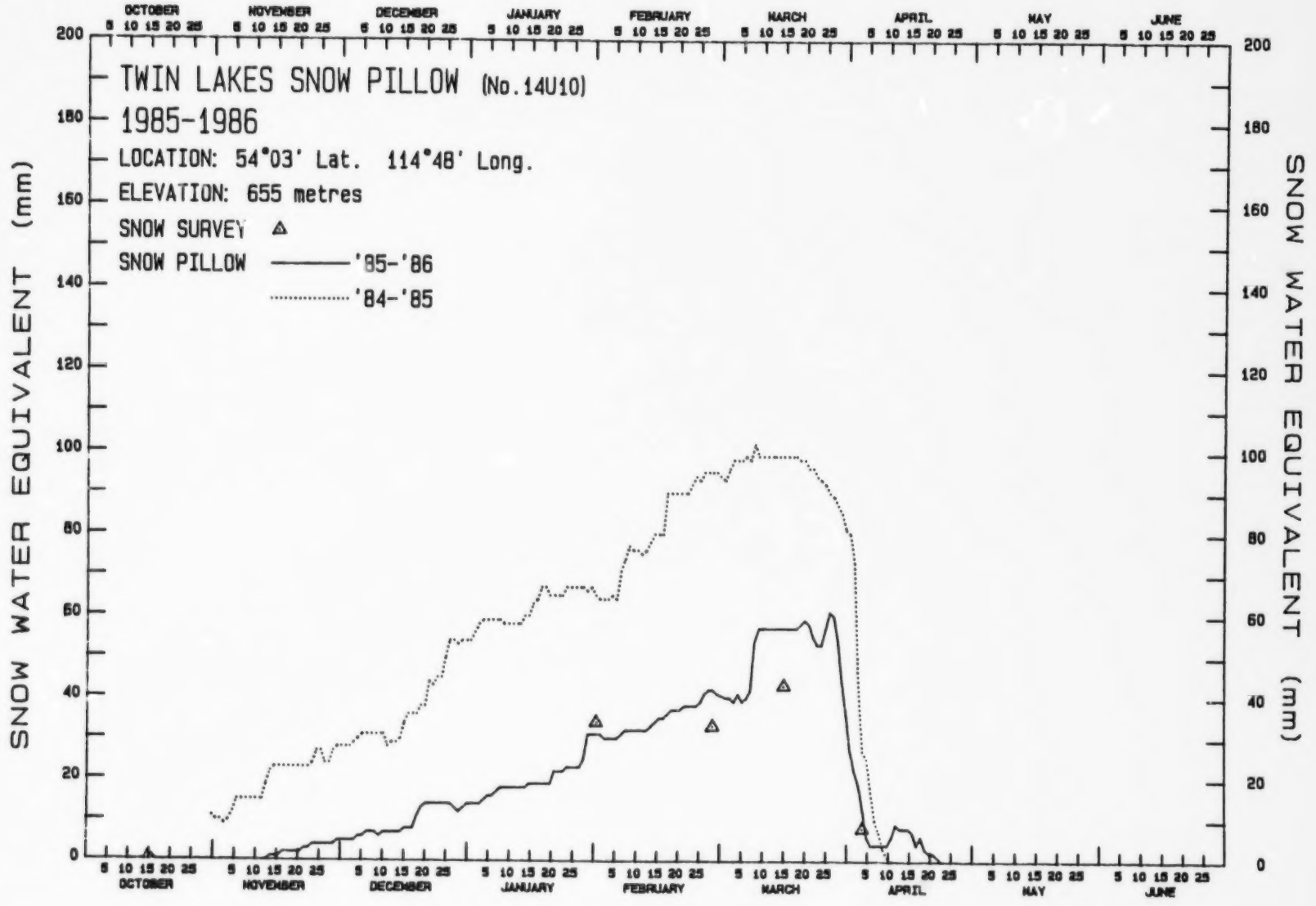

SPRING CREEK 2 SNOW PILLOW (No. 17U03)
1985-1986
LOCATION: 54°55' Lat. 117°49' Long.
ELEVATION: 655 metres
SNOW SURVEY △
SNOW PILLOW ——— '85-'86
SNOW WATER EQUIVALENT (mm)
SNOW WATER EQUIVALENT (mm)
OCTOBER NOVEMBER DECEMBER JANUARY FEBRUARY MARCH APRIL MAY JUNE
0 20 40 60 80 100 120 140 160 180 200

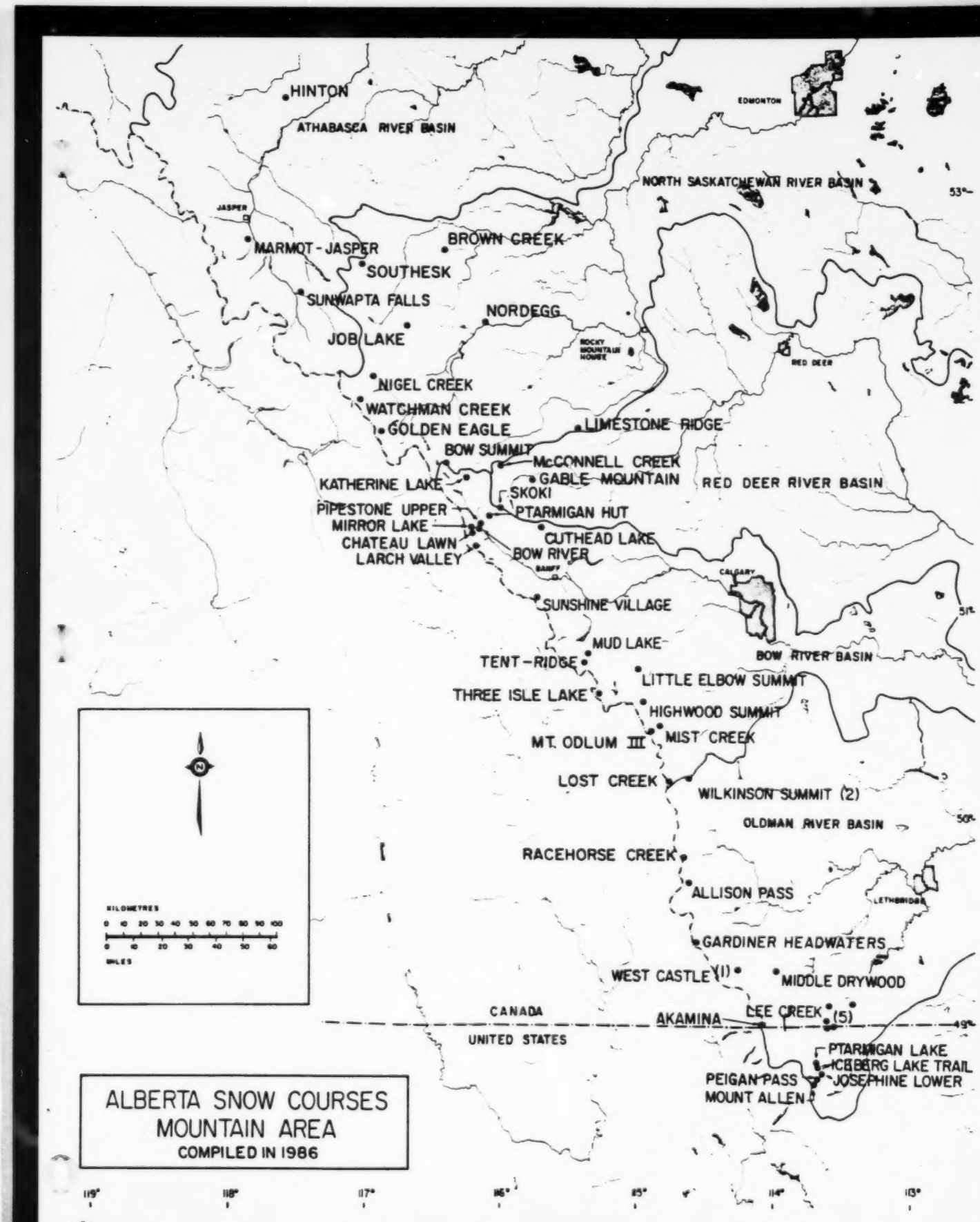
Alberta ENVIRONMENT



Alberta ENVIRONMENT




TWIN LAKES SNOW PILLOW (No.14U10)
1985-1986
LOCATION: 54°03' Lat. 114°48' Long.
ELEVATION: 655 metres
SNOW SURVEY
SNOW PILLOW '85-'86
'84-'85
SNOW WATER EQUIVALENT (mm)
SNOW WATER EQUIVALENT (mm)
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
0
20
40
60
80
100
120
140
160
180
200



ALBERTA SNOW COURSES
MOUNTAIN AREA
COMPILED IN 1986

Alberta
ENVIRONMENT

ALBERTA SNOW COURSES - MOUNTAIN AREA

Station Number	Station Name	Location Latitude	Location Longitude	Elevation (metres)	Year Established
OLDMAN RIVER BASIN					
14Z07	Akamina	49°02'	114°03'	1800	1980
13Z02	Lee Creek Site D	49°01'	113°37'	1660	1971
13Z03	Lee Creek Site E	49°01'	113°39'	1675	1971
13Z04	Lee Creek Site F	49°03'	113°29'	1570	1971
13Z01	Lee Creek Site P	49°02'	113°34'	1525	1971
13Z07	Lee Creek Site Q	49°03'	113°36'	1500	1971
14Z01	West Castle, Bush	49°19'	114°24'	1520	1967
14Z10	Gardiner Headwaters	49°21'	114°01'	1970	1983
14Z03	Allison Pass	49°44'	114°36'	1980	1963
14Z08	Racehorse Creek	49°49'	114°38'	1920	1938
14Y09	Wilkinson Summit, Bush	50°12'	114°33'	1980	1963
14Y08	Wilkinson Summit, Open	50°12'	114°33'	1980	1964
BOW RIVER BASIN					
14Y20	Lost Creek	50°10'	114°43'	2160	1983
14Y07	Mist Creek	50°31'	114°50'	1790	1965
14Y21	Mount Odlum III	50°29'	114°55'	2130	1984
14Y05	Highwood Summit, Bush	50°36'	114°59'	2210	1963
15Z25	Three Isle Lake	50°38'	115°17'	2160	1981
14Y18	Little Elbow Summit	50°42'	114°59'	2225	1979
15Y24	Tent Ridge	50°51'	115°22'	2025	1981
15Y21	Mud Lake	50°47'	115°19'	1910	1973
15X03	Sunshine Village	51°05'	115°47'	2230	1967
15X07	Cuthead Lake	51°27'	115°46'	2210	1979
16X14	Larch Valley	51°19'	116°13'	2230	1979
16X01	Bow River	51°25'	116°11'	1580	1937
16X08	Chateau Lawn	51°25'	116°13'	1740	1940
16X06	Mirror Lake	51°25'	116°14'	2030	1940
16X02	Pipestone, Upper	51°26'	116°10'	1615	1937
16X09	Ptarmigan Hut	51°28'	116°06'	2190	1967
16X15	Mount Skoki	51°32'	116°03'	2060	1979
16X16	Katherine Lake	51°41'	116°23'	2380	1980
16X18	Bow Summit II	51°42'	116°18'	2080	1979
RED DEER RIVER BASIN					
16X17	McConnell Creek	51°41'	115°59'	2130	1981
15X08	Gable Mountain	51°38'	115°45'	2150	1981
NORTH SASKATCHEWAN RIVER BASIN					
16X19	Golden Eagle	51°49'	116°56'	2090	1985
17W03	Watchman Creek	52°02'	117°14'	1830	1985
17W02	Nigel Creek	52°12'	117°05'	1920	1968
15X09	Limestone Ridge	51°54'	115°26'	1950	1983
16W01	Nordegg	52°24'	116°08'	1060	1973
16W03	Job Lake	52°49'	116°47'	2100	1985
16W02	Brown Creek	52°46'	116°26'	1340	1977
ATHABASCA RIVER BASIN					
17W01	Sunwapta Falls	52°33'	117°39'	1400	1968
18W02	Marmot-Jasper	52°43'	118°05'	1830	1970
17V01	Hinton	53°32'	117°57'	1240	1973

NORTHWEST TERRITORIES
MACKENZIE RIVER BASIN
Bistcho Lake
Hay River
Hay Lake
Zama Lake
HIGH LEVEL
Chinchaga River
Peace River
Whitegrass R.
FORT SMITH
Slave River
L. Athabasca
FORT CHIPEWAN
Clearwater River
12Q01
11Q03
11Q02
10Q01
11Q01
PEACE RIVER BASIN
Wabasca River
Namur Lake
Athabasca River
FORT McMURRAY
17S02
18S01
18S02
PEACE RIVER
Peace River
17T01
18T03
18T04
19T01
18T02
GRANDE PRAIRIE
17U02 to 17U05
17U06
Uhtuma Lake
North Wabasca L.
16T01
Lower Sweet L.
SLAVE LAKE
15T01
14T02
ATHABASCA RIVER BASIN
Winefred Lake
Loc La Biche
14U09
12U02
13U05
CHURCHILL RIVER BASIN
Cold Lake
10U02
COLD LAKE
14U07
14U08
14U10
12U03
WHITECOURT
15U06
14U06
13U03
13V03
12U01
11U02
Smoky River
15V07
Chip Lake
16V05
17V02
EDSON
15V04
14V02
12V01
EDMONTON
11V03
10V01
13V02
12V02
11V01
VERMILION
Saskatchewan River
NORTH SASKATCHEWAN RIVER BASIN
13V04
Pigeon
13W07
JASPER
15W01
14W02
14W03
15W02
ROCKY MTN. HOUSE
14W04
RED DEER
15X10
13W06
13W05
14X02
Battle River
11W03
10W01
11W02
12W01
CORONATION
RED DEER RIVER BASIN
ROCKY MOUNTAINS
BANFF
Bow River
CALGARY
BOW RIVER BASIN
BROOKS
OLDMAN RIVER BASIN
South Saskatchewan River
MEDICINE HAT
Oldman River
LETHBRIDGE
PINCHER CK.
17Z04 to 17Z07
17Z11
Police L.
Milk River
MILK RIVER BASIN
MONTANA
BRITISH - COLUMBIA
SASKATCHEWAN
ALBERTA SNOW COURSES
PLAINS AREA
COMPILED IN 1986
See list for names corresponding to station numbers shown
0 20 40 60 80 100 Miles
0 40 80 120 160 Km
Alberta
ENVIRONMENT

ALBERTA SNOW COURSES - PLAINS AREA

Station Number	Station Name	Location Latitude	Location Longitude	Elevation (metres)	Year Established
MILK RIVER BASIN					
10Z04	Gros Ventre, Middle	49°39'	110°22'	1220	1980
10Z05	Gros Ventre, Upper	49°38'	110°19'	1460	1980
10Z06	Mitchell Creek, Lower	49°37'	110°19'	1230	1981
10Z07	Mitchell Creek, Upper	49°40'	110°18'	1450	1981
10Z08	Ross Creek, Lower	49°41'	110°16'	1220	1980
10Z09	Ross Creek, Upper	49°40'	110°14'	1430	1981
10Z11	Thelma Creek	49°34'	110°16'	1295	1981
RED DEER RIVER BASIN					
15X10	James River	51°54'	115°00'	1210	1973
14X02	Sundre	51°47'	114°31'	1060	1973
14W04	Dickson	52°05'	114°10'	910	1973
14W02	Hoadley	52°49'	114°23'	970	1972
14W03	Bentley	52°29'	114°04'	910	1973
13W05	Innisfail, East	52°01'	113°35'	910	1973
13W06	Kneehill Valley	52°00'	113°42'	970	1973
BATTLE RIVER BASIN					
13V04	Pipestone Creek	53°04'	113°49'	790	1976
13W07	Wetaskiwin	52°59'	113°38'	790	1973
12W01	Gadsby	52°19'	112°23'	790	1973
11W02	Coronation	52°13'	111°15'	760	1973
11W03	Lougheed	52°40'	111°33'	670	1973
11V01	Mannville	53°10'	111°12'	670	1973
10W01	Wainwright	52°43'	110°37'	670	1973
NORTH SASKATCHEWAN RIVER BASIN					
15W02	Crimson Lake	52°25'	115°02'	970	1973
15W01	Brazeau	52°57'	115°41'	970	1977
13V02	Leduc	53°16'	113°33'	730	1973
14V02	Onoway	53°43'	114°10'	700	1973
13V03	Morinville	53°51'	113°29'	700	1973
12U03	Waskatenau	54°11'	112°50'	640	1973
12U01	Bellis	54°07'	112°05'	670	1973
11V02	St. Paul	53°59'	111°01'	640	1973
12V01	Elk Island National Park	53°35'	112°50'	700	1973
12V02	Bruce	53°17'	112°04'	670	1975
11V03	Two Hills	53°43'	111°43'	640	1973
10V01	Clandonald	53°34'	110°52'	640	1973

ALBERTA SNOW COURSES - PLAINS AREA

Station Number	Station Name	Location Latitude	Location Longitude	Elevation (metres)	Year Established
CHURCHILL RIVER BASIN					
10U02	Bonnyville, North	54°30'	110°40'	540	1973
ATHABASCA RIVER BASIN					
17V02	Obed	53°34'	117°13'	1090	1973
16V05	Edson	53°35'	116°14'	910	1973
15V04	Lodgepole	53°30'	115°21'	850	1961
15V07	Mayerthorpe	53°51'	115°19'	760	1982
15U06	Whitecourt	54°05'	115°36'	790	1973
14U08	Barrhead, West	54°11'	114°48'	670	1973
14U10	Twin Lakes	54°03'	114°48'	655	1982
14U06	Meadowview	53°59'	114°41'	670	1960
14U07	Barrhead, North	54°16'	114°21'	670	1973
13U03	Westlock	54°00'	113°58'	700	1959
14U09	Flatbush	54°44'	114°05'	640	1973
16T01	High Prairie	55°24'	116°27'	570	1973
15T01	Kinuso	55°20'	115°24'	640	1973
14T02	Saulteaux River	55°10'	114°14'	570	1973
13U05	Perryvale	54°28'	113°10'	670	1973
12U02	Grassland	54°49'	112°41'	570	1973
11Q01	Embarras Portage	58°23'	111°32'	210	1973
11Q02	Fort Chipewyan	58°45'	111°07'	210	1973
11Q03	Highrock Tower	58°48'	111°33'	210	1974
10Q01	Jackfish Village	58°25'	110°56'	210	1974
PEACE RIVER BASIN					
19T01	Hythe	55°19'	119°34'	760	1973
18T04	Sexsmith	55°25'	118°52'	780	1973
18T02	Bezanson	55°14'	118°31'	700	1973
18T03	Rycroft	55°41'	118°44'	640	1973
17U02	Spring Creek #1	54°57'	117°45'	720	1967
17U03	Spring Creek #2	54°55'	117°49'	650	1967
17U04	Spring Creek #3	54°57'	117°41'	730	1967
17U05	Spring Creek #4	54°55'	117°41'	740	1967
17U06	Little Smoky	54°44'	117°09'	670	1973
17T01	Girouxville	55°46'	117°20'	570	1973
18S01	Eureka River	56°31'	118°45'	700	1973
18S02	Fairview	56°03'	118°24'	640	1973
17S02	North Star	56°52'	117°38'	480	1973
12Q01	Sweetgrass	58°51'	112°00'	210	1977

APPENDIX B

ALBERTA ENVIRONMENT

REAL-TIME CLIMATE STATION

MONTHLY PRECIPITATION DATA

Alberta
ENVIRONMENT

Alberta ENVIRONMENT

ALBERTA ENVIRONMENT REAL-TIME CLIMATE STATIONS

OLDMAN RIVER BASIN

MONTHLY PRECIPITATION 1985 - 86

Precipitation in millimetres

STATION	MAP CODE	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
Akamina	1	127	25	126	181	95	95	135	79	66	31	143	75
Beauvais	10	54	11	23	79	33	66	84	57	28	36	198	64
Chief Customs	4	66	22	54	97	46	63	80	69	18	41	168	87
Gardiner Creek	9	147	44	173	183	107	120	117	121	54	49	168	114
Goat Haunt	2	98	22	145	227	101	65	104	69	38	13	104	66
Lee Creek	5	47	17	21	64	38	51	74	59	14	30	161	68
Medicine - Lodge	*	36	44	18	18	40	34	173	95	59	21	243	33
Pasque	13	42	5	31	80	40	56	79	62	62	50	71	50
Racehorse Creek	12	100	10	121	211	83	111	155	53	97	50	137	81
Red Rock	6	64	14	81	114	61	51	92	69	51	27	114	72
St. Mary Ranger Stn.	3	51	12	93	127	51	35	66	58	16	18	122	41
Spionkop	7	122	43	123	224	111	123	138	94	N/A	44	228	125
Streeter Creek	38	40	13	6	42	12	38	94	68	72	61	109	38
Vicary Creek	11	46	4	38	102	41	74	90	52	47	46	100	49
West Castle	8	127	20	156	186	90	84	102	87	70	20	114	90

NOTES: 1. The map code refers to the station location number on the key map which follows.

2. Average monthly precipitation values have not yet been established for these stations.

* The Medicine - Lodge precipitation station is located in the Milk River basin in Cypress Hills Provincial Park.

Alberta ENVIRONMENT

ALBERTA ENVIRONMENT REAL-TIME CLIMATE STATIONS

BOW RIVER BASIN

MONTHLY PRECIPITATION 1985 - 86

Precipitation in millimetres

STATION	MAP CODE	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
Burns Creek	39	31	7	26	73	43	39	89	78	82	69	73	34
Compression Ridge	20	30	10	9	46	22	50	138	78	156	89	120	31
Cox Hill	21	31	8	3	43	16	58	125	87	115	84	137	39
Cuthead Lake	27	48	8	56	97	77	56	103	106	98	63	120	33
Elbow Ranger Station	22	26	10	0	34	11	46	91	84	135	68	128	32
Evans-Thomas Creek	19	36	8	23	74	35	51	127	100	131	63	118	42
Forget-me-not	16	31	15	5	46	23	50	114	78	N/A	92	131	41
Ghost Diversion	25	38	8	3	43	15	43	97	103	91	55	139	14
Ghost Ranger Station	26	25	10	0	25	10	38	92	106	131	33	125	16
Jumpingpound Ranger Stn.	23	21	15	0	29	13	26	100	79	114	52	137	28
Little Elbow Summit	17	61	8	50	104	66	77	130	119	115	78	104	43
Sheep II	15	31	14	3	40	12	37	97	61	126	63	127	30
Sullivan	14	25	10	5	34	13	33	69	69	109	69	108	26
Sunshine Village	24	37	25	96	106	97	64	118	125	144	38	91	52
Three Isle Lake	18	79	21	107	139	98	105	130	134	212	53	123	63

NOTES: 1. The map code refers to the station location number on the key map which follows.

2. Average monthly precipitation values have not yet been established for these stations.

Alberta ENVIRONMENT

ALBERTA ENVIRONMENT REAL-TIME CLIMATE STATIONS

RED DEER RIVER BASIN

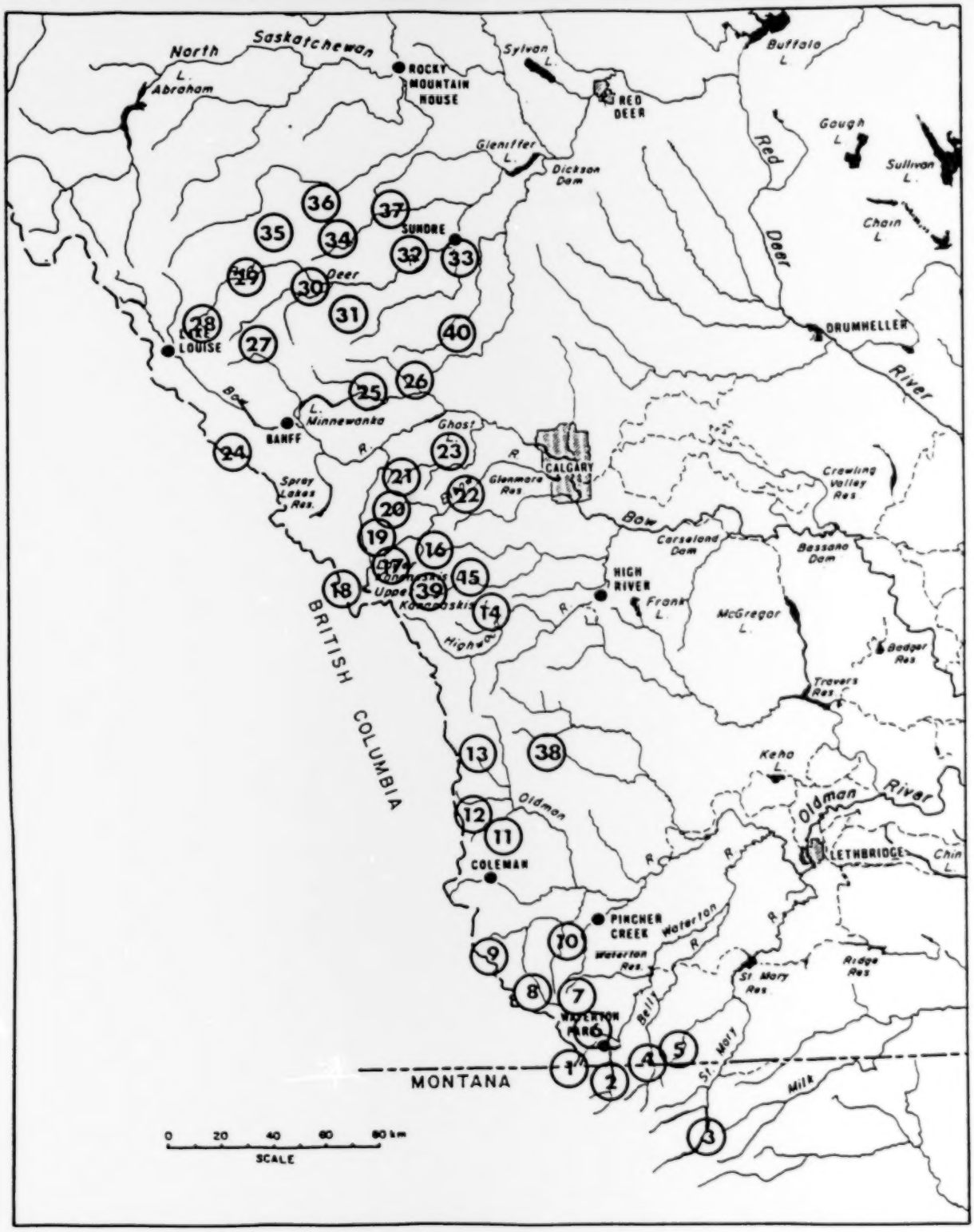
MONTHLY PRECIPITATION 1985 - 86

Precipitation in millimetres

STATION	MAP CODE	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
Coal Camp	32	32	14	1	27	19	54	105	130	205	66	140	16
Dogrib	30	28	10	4	36	23	54	114	87	191	33	140	21
Fallentimber	31	20	14	1	27	22	61	123	100	203	55	142	22
James River Headwaters	34	24	13	1	33	14	58	114	99	186	53	143	22
James River Ranger Stn.	37	28	11	1	21	8	33	114	135	171	38	155	11
Limestone	36	31	16	5	33	25	78	109	110	170	51	163	21
Scalp Creek	35	N/A	N/A	N/A	N/A	21	25	184	89	164	23	133	20
Scotch Camp	29	16	6	8	39	23	21	59	54	102	22	110	8
Skoki	28	53	8	52	93	65	33	77	75	108	29	116	28
Sundre Ranger Station	33	18	8	1	15	10	28	109	101	181	53	155	5
Water Valley	40	15	8	2	18	8	38	108	87	131	54	145	16

NOTES: 1. The map code refers to the station location number on the key map which follows.

2. Average monthly precipitation values have not yet been established for these stations.



KEY MAP FOR
ALBERTA ENVIRONMENT
REAL-TIME CLIMATE STATIONS

Alberta ENVIRONMENT